# THE RENAISSANCE OF THE GREEK IDEAL

DIANA WATTS

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BY

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(Mrs. Roger Watts)

WITH ONE HUNDRED AND FORTY-FOUR ILLUSTRATIONS AND DIAGRAMS

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*To all those who by their love and encouragement*
*have made this book possible*
*I dedicate it in gratitude*
*and affection*

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# ILLUSTRATIONS

# THE RENAISSANCE OF THE GREEK IDEAL

## CHAPTER I

### COMPARATIVE ANALYSIS OF THE ANCIENT GREEK DEVELOPMENT AND THAT OF THE MODERN HUMAN BEING

*"No citizen has a right to be an amateur in the matter of physical training: . . . . what a disgrace it is for a man to grow old without ever seeing the beauty and strength of which his body is capable!"*

SOCRATES. *Xen., Mem. iii.* 12.

OF all the lost secrets of antiquity, perhaps the most important is that which produced the enormous physical superiority of the Greeks over any other race of human beings known to us either before or since their time.

They proved for all time that this condition of physical excellence was possible in a human being. How the secret of its attainment was lost will probably never be decided, as not one of the many theories can ever be proved.

The fact only remains that a rising wave of unequalled physical and mental development carried these wonderful people on its crest for one brief period of realised perfection, during which they were able to grasp the full meaning of *Liberty under the Law*, not only as a nation, but also as individuals.

The modern human being has drifted so far away in physical form from the Greek as to fail to realise the differences. These differences, however, are not organic, but are in all probability the result of early training.

I myself began as an ordinarily active human being, but, in the course of training, development, researches, and discoveries, gradually acquired a knowledge that led to a condition which is nearer to that of the Greeks than any other that has yet been achieved.

The secret consists in a condition of the muscles totally different from any realised by athletes since the time of the Greeks, a condition of *Tension*, which transforms dead weight into a living force, and which made the Greek as different from the modern human being as a stretched rubber band differs from a slack one.[1]

There are frequent allusions in the *Iliad* to this power possessed by the Greeks of transforming their muscles on the instant into a condition of almost superhuman force, and although much must be allowed for Homer's poetical imagination, there is no doubt that this extraordinary

[1] It is interesting to note that, although the secret of how this condition was acquired has been lost, strong evidence remains that a special science existed, as will be seen in the following extract from Mr. Norman Gardiner's book on Greek Athletics:

"There arose in the middle of the fifth century a new science of gymnastics, which aimed not at the performance of particular exercises but at the production of certain physical conditions (ἕξις, *Xenophon, Mem.* l.c.; Aristotle, *Pol.* 1338 b.), especially the condition required for athletic success."—"Greek Athletic Sports and Festivals." E. Norman Gardiner.

PLATE I.

Photo Giraudon.]

The Herakles of the Aegina Pediment.

force was always produced by will-power acting on some special physical condition which resulted in a complete restoration of exhausted powers, taking away all sense of fatigue, and placing the body once more under an alert control.

It would be impossible to prove that the means by which I discovered this force in myself are the same which gave the Greeks their marvellous physical superiority; but it will probably be conceded that there is sufficient similarity in the results to justify the hypothesis.

Among the statues of the Aegina Pediment are one or two figures, the correctness of whose positions has been questioned on account of their seeming physical impossibility—notably that of the crouching Archer with the lion's head helmet, supposed to be the Herakles. This exquisite statue is an example of what, to the modern human being, is an impossible position, owing to the difficulty of maintaining a balance on so uncertain a base.

This was the first statue on which I tested my own newly discovered principle of balance in movement under tension, and with the test the whole sequence of movement came as a revelation. Passing through the positions which led up to that chosen by the sculptor, I proved it to be not only possible, but inevitable, as also the subsequent recovery to an erect position. In demonstrating the principles of balance, which make possible the momentary poise of all the most vividly animated statues, it is not enough to give a careful imitation of the one position chosen by the sculptor. To prove its naturalness and its truth, it is necessary to show what led up to that momentary poise, and what followed it, and if all three positions produce an uninterrupted sequence it is safe to conclude that the central poise is correct.

In giving photographs of my own reproductions of certain statues (for the sake of comparison with the originals) this is the method I have adopted, and in the case of three of the most important statues (from the point of view of movement), viz., the Discobolus, the Archer, and the Charioteer, of the Capitol, I have added selections from cinematographic photos showing how these positions were achieved.[1]

Plate I. shows the original of the Archer of the Aegina Pediment, and Plates II., III., and IV. my representation of his completed movement, while Cinema Series No. 1 gives the detailed analysis of each change of position,[2] with an enlargement of No. 12. One can picture him first, standing erect, peering round the corner of a boulder, or from behind a bush, watching for his enemy, when suddenly he spies him, and in an instant

[1] These cinematographic notes were taken in Paris at the Institut Marey, at the request of Professor Charles Richet, the President, who most generously presented them to me afterwards. On an average about ten cinema positions were selected from 100 actual film representations, the sequence being sufficiently clearly illustrated by this average. It should be remembered that the reading of cinematographic sequences begins on the left side and continues downwards, following on to the top of the second line, and so on. The first page of cinema detail has been numbered as a guide.

[2] Unfortunately the bow and arrow which are shown in the larger photos did not arrive in time for the cinema pictures, which were the first taken, but their absence makes no difference whatever to the actual movement.

PLATE II.

Copyright.]

First Position of the Archer.

PLATE III.

*Copyright.*

Second Position of the Archer.

PLATE IV.

C pyright.]

Final Position of the Archer.

# CINEMA SERIES, No. 1.



Representation of the Movement of the Archer.

(Enlargement of No. 12.)

PLATE V.

*Photo Alinari.*]

Bronze Reproduction of the Discobolus of Myron.
Terme Museum, Rome.

PLATE Va.

Photo Alinari.

Discobolus of the Castel Porziano.

drops from a standing position, in which he was exposed, to a crouching one, in which he is covered and can let fly his arrow in safety.

The drop is made in one single movement, by the simultaneous bend of the right foot and knee, and the throw-out of the left leg, with the foot well in front, to allow the greatest possible bend of the right foot and knee, all this having been performed without disturbing the vertical line of the torso. The recovery to an erect position is merely the drawing back of the left foot under the body, and the straightening up of the right foot and knee—in appearance an extremely simple movement, and strikingly beautiful because of its simplicity.

Plate V. represents the Discobolus of Myron, the photograph being that of the bronze reproduction in the Terme Museum in Rome.[1] Considered statically, it is a comparatively easy matter to reproduce the position of this statue correctly; considered dynamically, it has never been clearly explained. On the contrary, it has often been described as a contortion, and even Professor Loewy regards it in that light.[2] It has also been compared to "an involved figure of speech." But, as soon as the laws of equilibrium in movement are understood, this wonderful momentary poise explains itself with perfect clearness. The rules regulating the throwing of the discus restricted the competitors to a limited space, and in my interpretation

[1] A photo of the unrestored statue of the Castel Porziano in marble is also shown, as the resemblance of the cinema enlargement is stronger to this than to the bronze reproduction; this is given as Plate VA.

[2] "Nature in Greek Art." Emanuel Loewy, p. 87.

I have assumed that the Discobolus allowed himself four steps. The first position would necessarily be that of taking aim, represented by Plate VI. Although there was no special mark to be aimed at nor even any restriction as to latitude, it is obvious that the straighter the line of flight, the farther the discus would travel, and therefore the competitor would probably take mental note of some object he considered possible to reach, and aim for that. I myself found I could throw farther when aiming at some definite mark than when merely letting the discus fly at random. The wavering of indecision, replaced by directness of intention, finds its corresponding economy of force in the physical expression, which results in a more powerful throw. Plates VI., VII., and VIII. show the three striking positions from start to finish. That of taking aim is followed by a short run of three steps, and the swing back of the discus arm on the third step, accompanied by the simultaneous turn-back of the head to allow the maximum play of the shoulder-muscles and also to bring the whole weight in line over the base (see Plate VII.). All the force of the throw depends on the freedom of the shoulder-swing. This backward movement of the arm and head produces a momentary pause in the forward momentum, during which the left foot performs a supple trailing movement on the bent-back toes, offering no resistance either to the pause or the momentum, held in abeyance, as it were, ready for the final gathering together of all the forces in the actual throw. The whole weight of the body is on the right

PLATE VI.

Copyright.]

Taking Aim

PLATE VII.



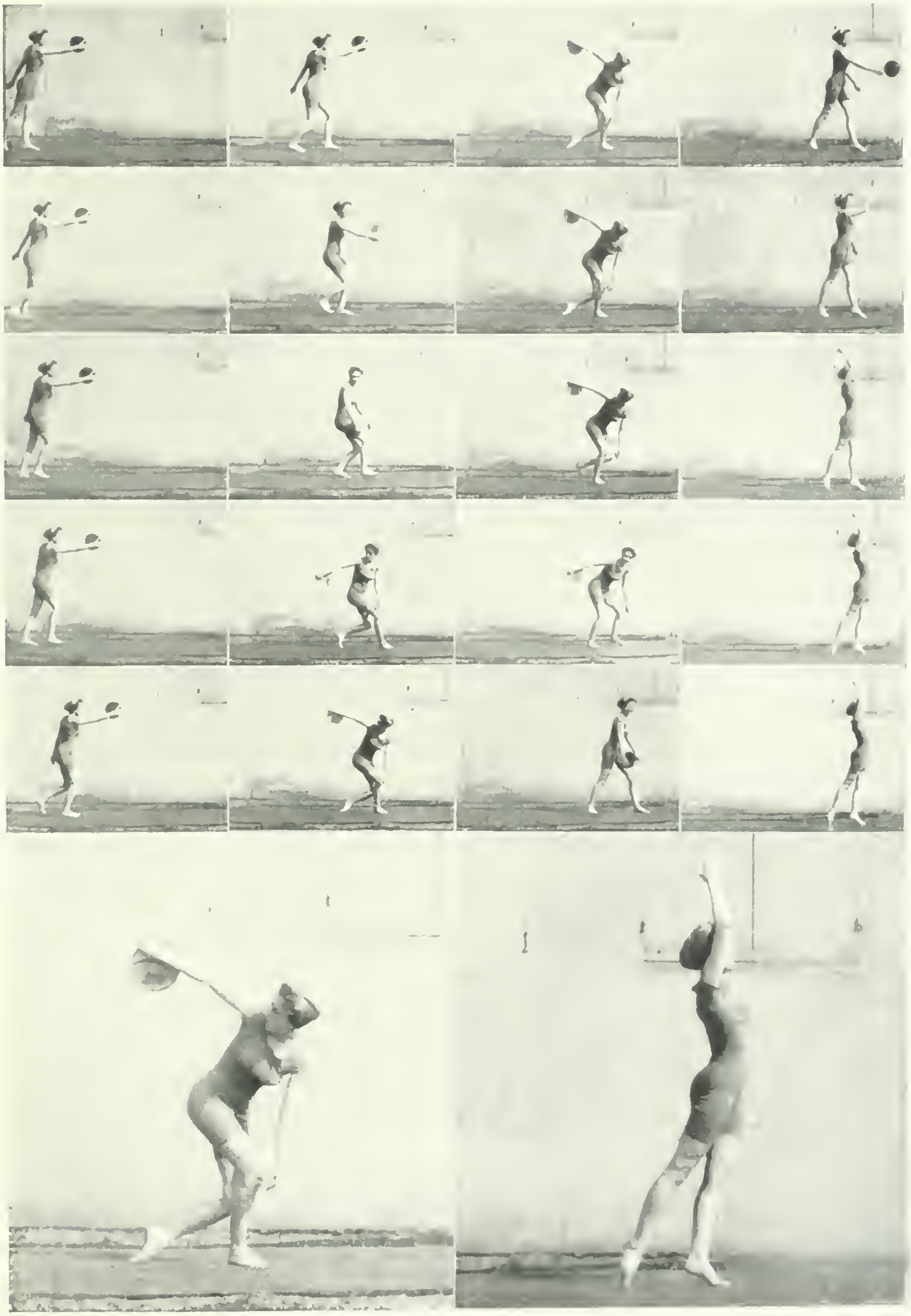
The Swing Back.

PLATE VIII.

Copyright.]

The Final Position.

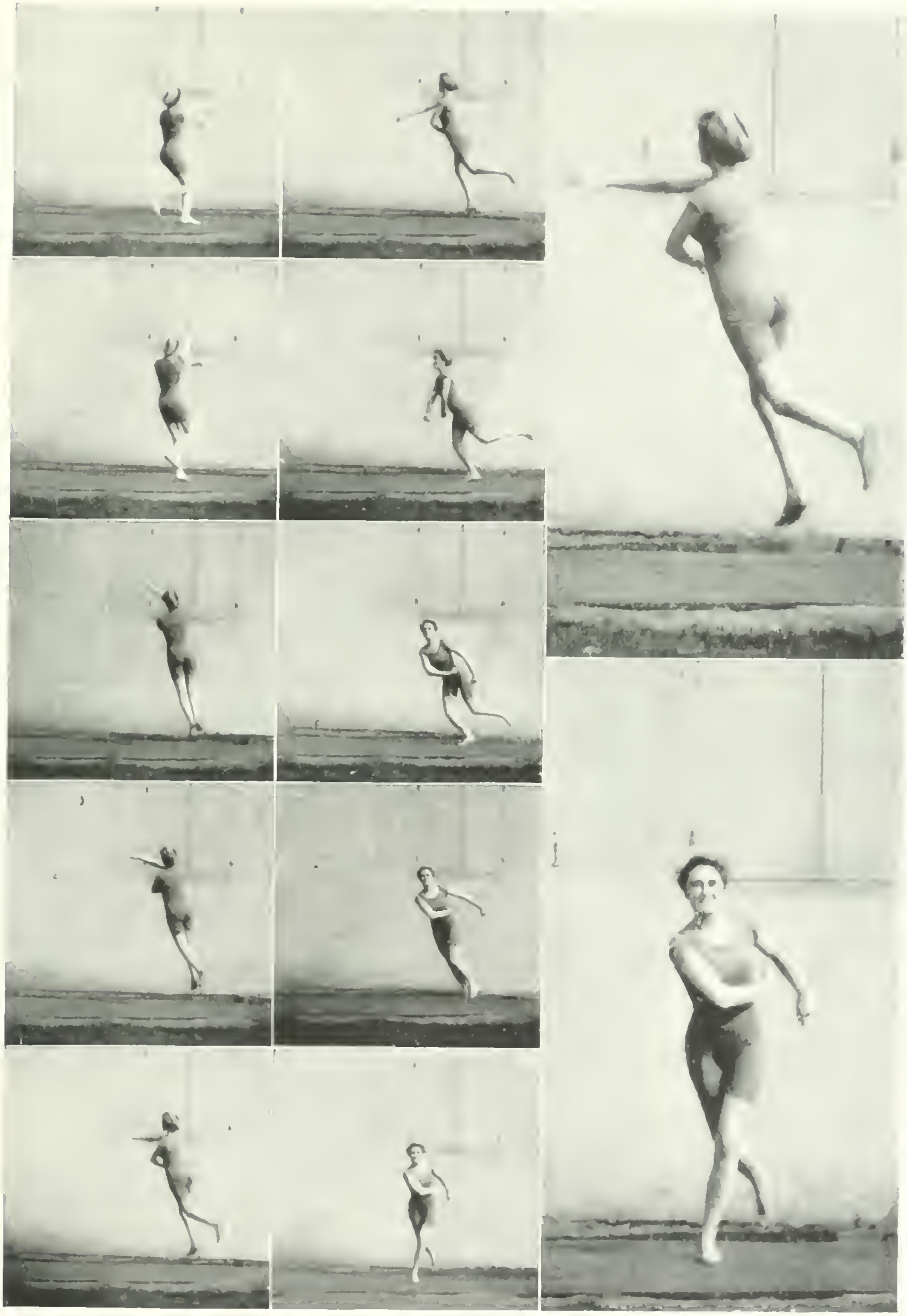
# CINEMA SERIES, No. 2.



*Copyright.*]

Movement of the Discobolus.

# CINEMA SERIES, No. 3.



*Copyright.*]

A Second Way of Finishing the Throw.

foot, whose toes grip the ground with tremendous tension, to prevent any pull back of the body by the backward swing of the discus arm.

Looking at this statue, end on, so to speak, one notices the decided lean-over to the left, although the centre of gravity is over the right foot. This is due to the necessity of counterbalancing the weight of the discus, which averaged 10 lbs. The final position of the Discobolus, as represented by Plate VIII., is the uplifting of the whole body as the discus flies forward. The force with which it leaves the hand determines the distance it will travel, and this force is dependent on the freedom of the shoulder-swing. The momentum is in the arm alone, produced by the rapidity of its swing in a loose, free shoulder socket. No body weight is needed in this instance, to follow on after the throw, as there is no opposition to the discus. Straight and far it has to fly, and acceleration is the thing to try for. The force or travelling power of an object thrown depends, not on the momentum of a following-on weight, but on the rapidity with which it leaves the hand, and this acceleration depends on freedom from friction or resistance. Therefore, anything that might hinder its speed must be carefully avoided. The main weight of the body must be so perfectly balanced that no danger of a fall forward can occur at the last moment. Body-weight, as a following-on movement, is needed only in the case of a blow. In this case, the arm meets with a sudden reaction from opposition, and the full power of a drive from the shoulder can take effect only when the body-weight follows closely on to counteract the effect of the reaction.

In the final position of Cinema Series No. 2, which gives a detailed analysis of the changes, it will be seen how the rapidity of the arm-swing has carried the arm itself far above the head, lifting the whole body straight into the air, with its forward foot still in vertical line with the centre of gravity. The central position of this series has been enlarged for the purpose of comparing it with that of the statue, and when it is remembered that the rapidity of the whole movement is such as to render impossible any conscious imitation of one special pose, the differences between the two are surprisingly small. The final position has also been enlarged for the better observation of the tremendous tension in all the leg and foot muscles. The rapidity of rotation, on which depends the accuracy of aim, is given by the final twist of the forefinger as the discus leaves the hand, which movement also governs the height of the trajectory, an important factor in the distance reached. At the moment the discus leaves the hand, the body is drawn up to its full height, tense with the instant arrest of all momentum, the weight poised over the left foot, which has come forward on the trailing movement, ready for the fourth step, which it takes as soon as the body is erect, checking any chance of overbalance from the force of the throw. Thus, the final position is almost identical with the first, with this difference, that the body is more erect, and the head is thrown back instead of being lowered to the line of the right arm as when taking aim, and the arm itself is above the head.

Cinema Series No. 3 gives ten photographs representing a different finish, which alteration begins the moment the discus leaves the hand. In this series, instead of coming to a full stop on the highest lift of tension, I turned all the force of the throw back on itself, as it were, and came right round in a circular leap in which the right arm acted as motive-power.

The final position of this series is an almost exact reproduction of that represented occasionally in vase paintings, a photograph of which I have been unable to find up to the present moment. It would seem probable that those athletes who were not quite sure of themselves for the suddenly-arrested finish, practised the circular leap back to avoid over-stepping the boundary. It is difficult to see what other explanation could account for the complete reversal of position shown on some of the vases. An enlargement of one of the positions while in the air is shown for the purpose of demonstrating the force of the arm-swing which is so obviously carrying the body round with it. It would seem at first sight that both these statues, the Archer and the Discobolus, might be quite easily represented in movement, but the first attempt will prove that this is not so. The sequence of all three positions in each case is only possible to achieve with muscles exquisitely trained to elasticity, exceptional activity, and balance.

# CHAPTER II

## THE ESSENTIAL TRAINING OF THE FOOT AS BASE

THE Greek child was sent to the Palaestra at the age of five, and, judging by the testimony of Greek Art, the mothers must have modified the shape of their children before they began their gymnastic training. Antique Art gives us many illustrations of this. We have no grounds for thinking that the Greek baby was different from any other baby, but every reason for thinking that the Greek mother was responsible for its eventual development, more especially for the way in which it stood and walked.

The neck was carried much farther back on the spine without throwing the chin in the air; the hips also were more behind the body than under it; the elbows farther back and turned in instead of out. Above all, the child was made to walk on the inside of its foot with the toes planted in straight line with the heel; never turned outwards.

Finally, when the child went to the gymnasium, the object of its training was not how to develop its muscles, but to learn how to transform their condition, at will, into one that rendered the whole body master of itself on the instant.

The result of this was twofold. In the first place, it entirely abolished all sense of fatigue, and, in the second, it gave an extraordinary precision of movement, the outcome of a perfect command over the muscles.

There are many illustrations on vases of the importance evidently attached to exercises performed along straight lines, the trainer standing behind the pupil giving instructions, while the pupil is advancing, with eyes fixed upon some distant object, in the endeavour to maintain some special position of balance. One vase in the British Museum represents a baby crawling on its hands and knees, with a trainer behind it, and the mother some distance in front holding out her hands. The trainer carries, as usual, a long stick, with which he emphasises his explanations and guides the small pupil along a line.

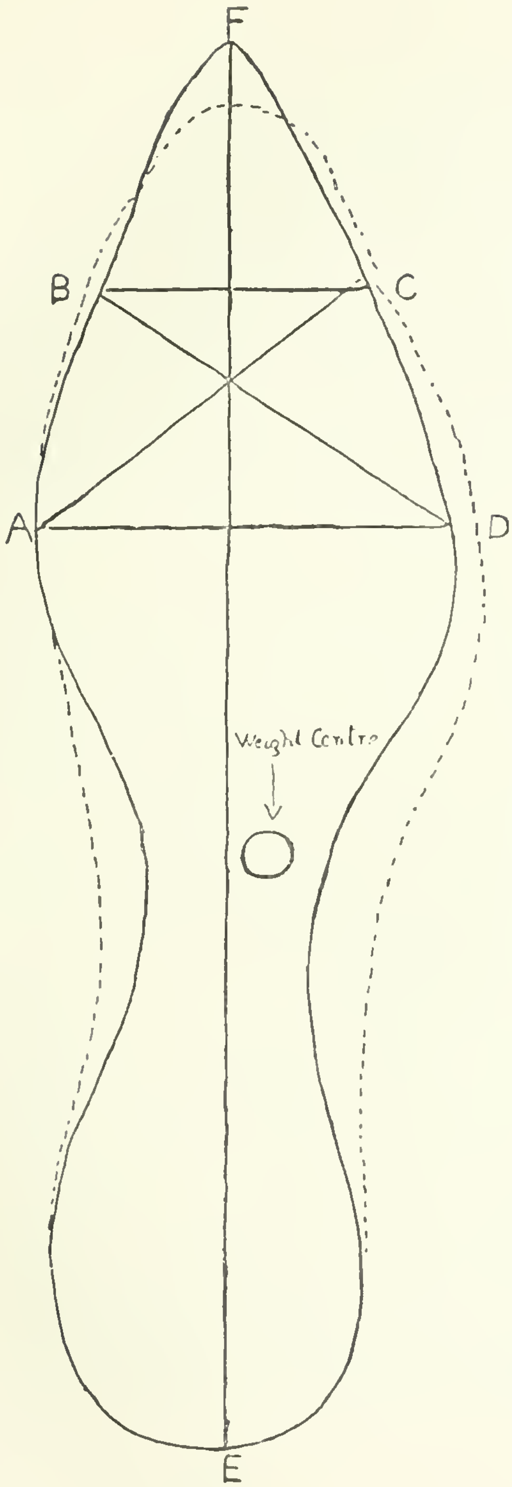
The two most important things, then, with which the Greek child began its physical training, were: the cultivation in its muscles of a condition that made possible the maximum amount of activity, and the mastering of the laws of balance, which enabled that activity to be controlled with the smallest expenditure of force.

The feet, being the most important factor in balance, received the most careful training, and Antique Art gives numberless illustrations of special movements on the ball of the foot, to accustom the pupil to dispense entirely with the heel as necessary security for balance, and teach him to maintain the centre of gravity over the forward part of the foot. This is the explanation of the beautiful Greek foot. The form of the Greek foot is totally different from that of a modern foot, and the strange sense of flying which is expressed in nearly all antique representations of movement is due to these wonderful feet. The first three toes were very much longer, and were thin and nervous like fingers; the fourth toe was barely used, and the little toe not at all, being nearly always well above the ground, the reason for this being the spread of the pad on the outside of the foot, which formed a sort of wing on which all the ground contact and movement were centred. This wing, which is that part of the pad immediately below the little toe, was the secret of their wonderful flying movement. It has practically ceased to exist, but so great is the power of predestined form, that, in spite of years of distortion, Nature, if given a chance, will repair to an incredible degree all human errors of this type.

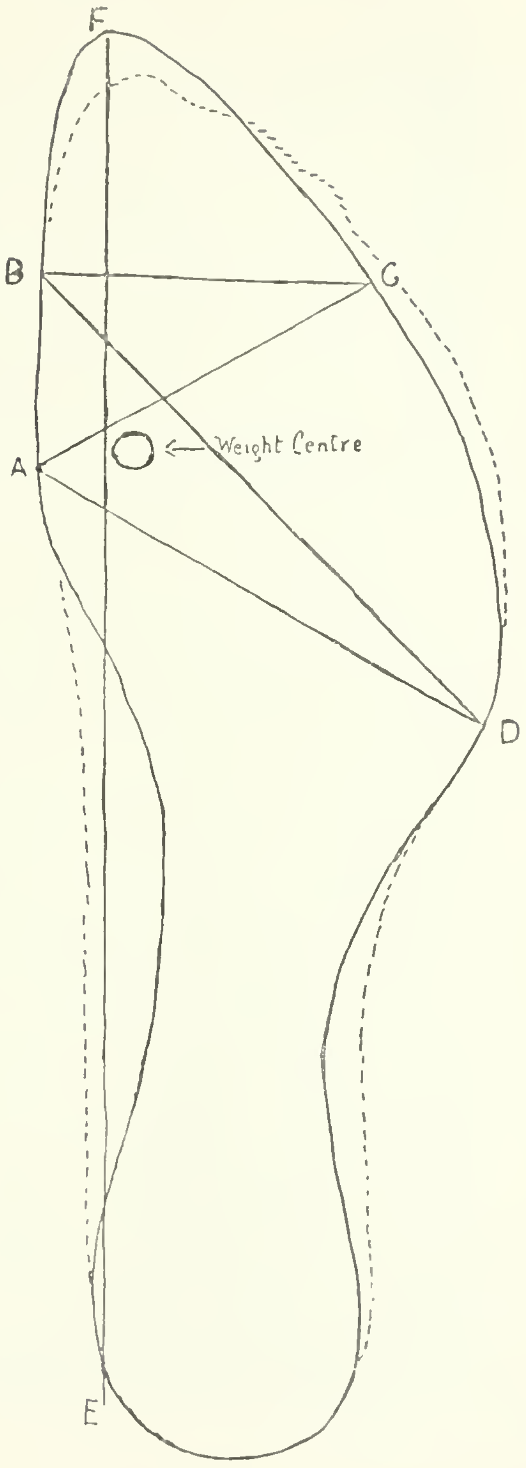
Plate IX. is interesting from this point of view. The dotted lines represent the outline of my own foot without a shoe, taken at an interval of five years between the two diagrams[1]; while the thicker lines represent the respective soles worn,—in the case of No. 1 five years ago, and taken from a smart Bond Street shoe, and, in the case of No. 2, that worn at the present day, and made by an equally smart Sloane Street shoemaker. In Diagram 1 it will be noticed that the point of the toe is in direct line with the middle of the heel, as shown by the line E to F, which is the invariable way of making the modern shoe of a woman. To fit the foot into this line, the joint of the big toe, where it meets the ball of the foot at point A, has to be bent over towards point F. This contortion is quite possible, as this particular joint is a partially

[1] These diagrams have been of course reduced in size.

# PLATE IX




No. 1.
The foot when wearing the habitually shaped shoe.




No. 2.
The foot when allowed perfect freedom.

revolving one; but it was made so to facilitate a more perfect balance on that part of the foot destined to carry the weight of the body, and this fact proves Nature's intention of leaving absolute freedom at that point. The result, therefore, of bending the toe to the side, locks this joint, and makes even a slight bend a constant strain. But, what is still more important, this contortion makes impossible any bend at all of the second joint of the big toe (*B*), which is formed to move backwards and forwards *only;* and with the rigidity of this joint comes the paralysis of all joints in line with it.

Diagram 1 on Plate IX. will make this clear. *A* represents the junction joint of the big toe and the ball of the foot, *B* the second joint of the big toe, rendered rigid by the unnatural angle of *A* to *F*. The fact that *B* is unbendable renders *C* also rigid; therefore the only possible bend in the forward part of the foot is in a straight line across the ball from *A* to *D*, and all in front of that line is rendered useless, although it is the only part provided with joints and elasticity.

The actual movement of the foot is thus restricted to leverage from *E* to *A* and *D*, and as there are no joints in this part of the foot but only a strong tendon, *which depends for elasticity on the freedom of A*, the movement cannot fail to be performed in jerks, and the weight centre is thrown back to midway between *A* and *E*. The wrench of the muscles at *A*, necessitated by the angle *AF*, produces callosities smaller or greater according to the weight of the individual. Diagram 1 is a *good* specimen of the foot of a modern woman, yet even this represents pain and fatigue and distortion, *solely* from the fact that joint *B* is unbendable.

Diagram 2 on Plate IX. is an outline of the same foot five years later. Joint *A* has been liberated by making the shoe a different shape, and restoring the angle *AF* to a straight line, and Nature has responded by bringing back the big toe into this line, as was always intended. This gives *B*, which can only bend forwards and backwards, the freedom it needs, and at the same time liberates all joints in the line from *B* to *C*. The swing-back of the big toe into a straight line considerably shortens the line *A* to *B*, while it enormously lengthens that of *F* to *D*, the lengthening process taking place in two directions, viz., from *C* upwards to *F*, and from the same point downwards to *D*, gradually getting lower as the wing of the foot responds to its freedom and takes its natural spread. The nearer point *D* becomes to the narrowing waist of the foot, the more perfect will be the spring and balance of the movement, for the reason that the triangular bend from *D* to *A* and on to *B* constitutes a complete leverage in itself, without the need of any help from the heel. The weight-centre is carried forward from the middle of the waist of the foot to a point on the ball of the foot, a little inside *A*, and the line *E* to *F* is now traced from the inside edge of the heel to the point of the big toe. Having restored the use of the forward part of the foot, and relieved the heel of weight it was never intended to carry, the mainspring or tendon which is placed all along the waist of the foot and works in connection with the tendon Achilles, becomes strongly elastic, and the heel itself becomes much smaller, the tendon Achilles finer, and more nervous, and all the thickening and swelling of this tendon, which is usual under modern conditions, disappear, and it is possible in many cases for the foot to become a thing of beauty, even after having lived many years in a distorted condition.

I have gone into this subject of the foot at such length on account of its enormous importance in all that has to do with the highest development of balance. The more perfect the development of the human being becomes, the more rudimentary will become the little toe, which is only needed in a condition of uncertain balance. The gradual development of the ape is sufficient proof of this. In the period when he used all four limbs alike, for climbing and scrambling, the uniform formation of all four extremities was that of a hand—he was literally quadrumanous. Gradually, he became more frequently erect, and the unaccustomed strain of a heavy body on only two of the limbs forced the knees outward and gave him his bandy legs. His weight was thus thrown on the outer edge of the foot, the little toe and its neighbour were specially developed, with the result that as the ape exists at present, his feet are *wide at the toes.* But his toes are gradually shortening, and although the knees are still bent, he is quite sure of himself on two legs. In all primitive tribes, this widening of the toes will be noticed, together with the projecting heel, both being the result of the outward bend of the knee, to a greater or lesser extent according to the different races. And as the feet are the last to change, in many cases the knees are already finely developed while the toes remain spread, as, for example, with that magnificent tribe the Zulus, although even there the majority have still the outward curve at the knee. The large projecting heel is also a result of the effort required to preserve an uncertain balance, and this, like the little toe, becomes less than half its original size when a perfect balance transfers the weight-centre to the ball of the foot.

To this gradual straightening into an erect position may be ascribed another extraordinary result, the importance of which cannot be exaggerated. The ape is becoming more intelligent; he is developing into a reasoning animal, and quite lately he has begun to throw stones! I suggest that this awakening of the intelligence may be attributed to the altered position of the diaphragm, which in the human being is the radiating centre of all power and control through the medium of tension, and would appear to have become so through the influence of some unknown force operating through the vertical only.

To return to facts, what I wish to make clear at this point is the connection between the widening foot and the outward bend of the knees produced by uncertain balance. When that becomes true and secure, the knees become gradually straighter, and the weight-centre is brought into so direct a line over its base that a very much narrower one suffices, and finally the straightened main bones of the leg and instep which end at the big toe are the only ones required for balance.

The result, then, of a perfect poise, is the narrowing of the toes, with a concentration of the movement upon the three longest, and a corresponding diminution in the size of the heel. All *sensation* of balance has to be transmitted through the feet, which constitute the only normal point of contact with the earth for the erect human being.

The feet, then, are the first to register any alteration in the balance, and should for that reason be the first to receive a care and a training that will enable them to respond unerringly to a rapidly-changing centre of gravity.

It seems hardly necessary to point out that this training involves the complete renunciation of the high heel, which in itself means an entire readjustment of the weight of the body, and at first it feels strangely unbalanced; but when the springs reassert themselves, as they surely will, one awakens to a new world, to a consciousness that the familiar metaphor of "walking on air" has become a reality, when every touch of the feet to the ground sends a thrill of elasticity ringing through one's nerves.

It may be argued that the use of the high heel *has* the effect of throwing the weight forward on to the toes. This is quite true, but it must be remembered that the toes in this position are *rigid*, and the angle at which the foot is unavoidably placed on the ground takes away all elasticity of the tendon which forms the mainspring of the foot, so that it becomes powerless from being constantly at full stretch. The whole foot having been made rigid under these conditions, the weight of the body, if held erect, would naturally pitch forward upon the toes; but as these are unable to make any independent movement of adjustment, the balance has to be saved by the knees, which become bent to prevent the fall forward of the body. Thus, while the springs of the instep are strained to breaking-point, those of the knees never reach their full stretch, and eventually become contracted. The actual weight of the body under these conditions is thrown back upon the heel, although the toes actually touch the ground first.

People often object on the score of ugliness to the abolition of the heel and the alteration of the ordinary pointed toe of the modern shoe, and I confess that everything I have ever seen which claimed to be a "naturally" shaped or "hygienic" shoe has been of a form that would have made me willingly wear a distortion forever rather than see my foot in one of these exaggerations. Some people may have square feet, but on the other hand many of us have not, and as no amount of assurance as to the beauty of the straight inside line will carry conviction, I have thought it best to give a photograph of my actual shoes.

Plate X. shows a pair of walking-shoes with a small three-quarter inch heel, which are identical with those of the indoor shoes, but with the small heel added for protection against street mud.

Personally, I would recommend that all shoes should have equally thin pliable soles, to enable the springs of the foot to work freely; the movement thus promoted, together with a soft felt inside sole for cold weather, ensures more warmth than a thick hard sole can ever do.

It may be questioned why the professional dancer, when not actually pirouetting on the extreme point of the toe, walks with the natural heel very obviously touching the ground first, although there is no artificial heel on the professional dancing sandal. The explanation is that all professional dancing has been acquired at the cost of contortion of the toes, and of all the muscles over the instep, even in the case of the finest modern dancing as shown by the Russians.

This contortion makes possible for quite long periods the performance of marvellous feats of balance on the extreme point of the big toe, but when it is not possible to continue these movements any longer, the weight of the body falls back inevitably upon the heel to relieve the overstrained toes. For this reason no dancer, however wonderful on the stage, will be found to have beautiful movements in walking, stage perfection, however marvellous, being the result of trick work, possible only to acrobats, and resulting inevitably in the abnormal development of certain muscles together with a stupendous overstrain of all the vital organs. This it is that makes the life of the professional dancers such a short one, and in Russia they are not allowed to appear on the stage after reaching the age of twenty-five, being considered by then quite finished!

PLATE X.



A Pair of Walking Shoes.

# CHAPTER III

## DEFINITION OF TENSION

AT THE beginning of the last chapter, I said that the first thing the Greek child learned when it went to the Palaestra was, how to attain in its muscles a condition that rendered the whole body master of itself on the instant.

This condition was one of *complete Tension.*

The meaning of this word "Tension" has become so distorted that, being confused with rigidity, the stiffness and strain of unnecessary force, it is generally considered as a condition to be avoided.

The true definition of Tension is "Elasticity."

That which is given in the "Elements of Dynamics"[1] is as follows: "Tension is the stress when two bodies are connected by a string, and the force exerted on either is directed towards the other. Thus, when a mass is suspended by a string from a fixed support, the force which keeps the body in its place is directed upwards, the force which is exerted on the point of support is directed downwards."

This definition is rather difficult to understand at first, by reason of the statement that "the force exerted on either is directed towards the other," which appears contradictory but, with a little thinking, becomes quite clear.

Tension is obviously *stretch*, or, to use the technical term, stress, which condition becomes one of elasticity

[1] Rev. J. L. Robinson, M.A.

to a greater or lesser degree according to the material subjected to it. This condition of *stretch* was the preliminary essential for the muscles in all exercises of training performed by the Greeks.[1]

Up to the present time no study whatever has been made of this essential condition, nor has any emphasis been laid upon the fact that no precision of movement can be acquired without it. Yet it is only when there is complete connection, through stretch, of all the muscles with the centre of gravity, that any movement can be said to be executed without strain. Relaxation of this stretch means disconnection of one set of muscles with another, involving independent movements, independent reactions, and proportionate loss of *combined* force; while the maintenance of this connection through stretch, means a condition in which every muscle has

[1] In Professor Marey's book on Movement the following passages occur:

". . . Is (the) elastic force of rebound due to a physical property of the muscles, or is it due to an additional expenditure of energy? Weber demonstrated that a muscle when in action acquired, by some intimate change within its fibres, a greater elastic force, and that it was this force which produced movement. The same thing happens, then, in a living tissue as in a steam-engine, in which the elastic force of a gas is converted into work. . . .

" Veterinary experts have made a special study of the energy lost by the hoofs striking the ground when a horse is travelling at a rapid pace. They maintain that the flexor of the solitary toe, which constitutes the foot of a horse, is made to a great extent of elastic tissue. It possesses in consequence a physical property by means of which a more or less important part of the vital energy lost in falling on the feet is to some extent returned in the form of energy.

" This subject deserves re-investigation. It would be interesting to discover whether tendons in man possess this valuable property to any noticeable degree, and, if so, whether it is retained through life."

The theory contained in the following chapters may suggest an answer to Professor Marey's query.

been called upon to share in the work required, having been linked with others which in their turn come directly in touch with the weight to be moved, or held still, as the case may be.

Tension, then, is a connecting of the farthest outposts with headquarters; headquarters meaning in this case the centre of gravity, the centre of the main weight. This linking together of every muscle produces the maximum of power with the minimum of effort, resulting in movement all in one piece, as it were.

If the connection of the muscles be not complete, if any part of the body is slack, it means just so much *dead weight* to be carried, and just by so much drag upon the movement will the rhythm be dislocated. Dislocation means strain and fatigue owing to the disturbance of proportion of the forces in activity.

Imagine a sailing vessel in full sail with the foresail or mizzen flapping against the mast! You can't expect the mainsail alone to carry the vessel along smoothly, with a dead weight of canvas swinging her out of stride. But haul in the ropes, and stretch every inch of canvas taut and tense, and then see the rhythm and harmony that wake into life!

The modern human being has lost sight of the fact that the skeleton was not made to support, alone, the whole weight of the body, but to facilitate exactitude of movement by its system of leverage. The muscles are the principal weight-carriers, and able, when in a perfect condition of tension, so to disperse the weight along their constantly-moving cords of elasticity that no *aggregate* of weight is ever felt at any one point, and therefore no dead weight of fatigue is possible. It is at the waist that the lack of tension in the modern human being is most apparent, there being nothing but the spine as bone support for all that part of the body which extends from the lower ribs to the hips. But in reality there is the muscle of the diaphragm going through the centre and those of the abdomen in front, while at the back are those forming a thick band on each side of the spine and spreading up and around the sides as the *latissimus dorsi*. These central muscles of the diaphragm, abdomen, and back are practically powerless in the average modern human being—in the case of women, on account of strongly-boned corsets which preclude all free movement of this part of the body; and in the case of men, from a general slackness, perhaps a reaction from an earlier period of exaggerated stiffness. The result of chronic slackness in these muscles is the crumpling-up of the waist and the settling down of the body into the hips, very much like an egg in an egg-cup. The constant pressure and dead weight of all the upper part of the body on the hips puts the whole strain on the hip muscles, which become exaggeratedly developed, while those of the abdomen and the cuirass muscles on each side of it are practically non-existent.

The most noticeable result of the condition of tension in the Greeks was the invariable slimness of hip, not only in the men but in the women also. This was due to the proper development of the waist muscles and those of the back, which was sufficient to keep the upper part of

PLATE XI.



A Lesson in Tension.

the body lifted from the socket of the pelvis and allow of an infinitely freer movement of the hips. This in itself was sufficient to keep the hips fine and slim.[1]

The new-born infant begins life with a very strong, little diaphragm, and all movement for the first weeks of its life is centred there. Later on, it discovers that it has limbs, and as it grows older the discoveries extend to hands and feet and finally fingers and toes, while the nervous muscular centre of the diaphragm becomes forgotten by the child and neglected in its later training. But here, in the very centre of what seems to be the softest part of the body, lies hidden the dynamo of the magic current of tension, which can be turned on at will and sent racing through muscles prepared to receive it, flooding them with force and with fire, transforming them into living, vibrating cords, responsive to every command of the will, so that motion becomes, in fact, *will-power* made visible.

It is not too much to assert that all the evils of mal-development come from the neglect of this part of the body, and all beauty and strength and perfect balance from the care of it. I have pointed out that the increasing intelligence of the ape may reasonably be ascribed to

[1] One of my pupils discovered not long ago, in the British Museum, the vase-picture represented on Plate XI., and, struck by the similarity in the teaching of the Greek master to those principles emphasised by myself, had the picture photographed and I reproduce it here. Note the position of the pupil in which every muscle is slack, how the air of depression is increased by the design above his head which the artist has made with an intentional overshadowing bend, that he might emphasise to the utmost the slackness and weighed-down appearance of the pupil. Then look at the Master, and note the strength and uplift of his poise, which again is emphasised by the direction of the design. Surely a fine object-lesson this, in the art of Tension!

the development of the diaphragm resulting from the gradually-increasing erectness of carriage. With the straightening of the spine, the expansion of the lungs, and the lifted poise of the head, the diaphragm develops a new power, and becomes henceforth the generator of a different order of activity, the centre of a perfected balance, and the medium of a higher control.

It is interesting to note that experiments are being carried on in America in connection with the walk of low-class criminals. It has been found that they habitually drag their feet along the ground instead of raising them. One of the experiments consists in making them walk over blocks of wood in the exercise-yard. This has necessitated a greater effort of balance and consequently a straighter back; and even this simple experiment has been found to ameliorate very definitely the mental condition.

Looking at an ordinary class-room of boys or girls, or a lecture-room full of men and women, the first thing that strikes one is the prevalence of the so-called "round-shouldered" position. And yet none of them are really round-shouldered. It is a very difficult thing to change the position of the shoulders. To bring them forward, and keep them so for more than a moment, is extremely tiring, and the modern human being is not keen on unnecessary effort. What one *really* sees in these lecture-rooms is not round shoulders but slack diaphragms, a much greater evil, and the cause of all the fidgety unrest that takes hold of audiences when obliged to sit still for more than half an hour. A very simple experiment will prove the fallacy of the "round shoulder." If one sits in an ordinary straight-backed chair, at right angles to a mirror, in the so-called round-shouldered way, it will be noticed that, while the shoulders themselves lean against the back of the chair, the base of the spine will be several inches in front of it. Thus the whole strain falls upon the small of the back, which at once gives way and curves outward, while the waist collapses in front and curves inward, giving the effect of a huddled-up, round-shouldered position. The reversal of these curves is produced by sitting farther back, so that the base of the spine touches the back of the chair. This pushes out the diaphragm in front, which movement places the upper part of the body in a correctly-balanced position, which, so long as the diaphragm remains firm, may be maintained for long periods without the slightest effort, the centre of gravity being exactly over its support, which in sitting should be the base of the spine. This position reduces to a minimum the ache of a long day's motoring, and the discomfort of lecture-room chairs, while it entirely does away with all appearance of round shoulders. And the alteration in appearance and comfort has been made by the movement of the waist alone, by the raising and stretching of the diaphragm from its ordinary crumpled-up, contracted condition. This stretching of the diaphragm, involving as it does a straightening of the spine, has also a definite effect upon the power of concentrating the mind on any particular subject. Look at the poise of the seated Buddhas in India, China, and Japan; note the vertical spine, the perfect poise of the head, and the gracious attitude of the shoulders. They knew the importance of the correct sitting posture as an aid to deep thought.

To return, then, the preliminary essential condition for all perfectly-balanced movement is that of *full stretch*. Henceforth, this stretching into Tension of the whole body will be termed the Preliminary Position, and it must be clearly understood from the first that any exercising apart from this condition is practically useless where fine balance and precision of movement are aimed at.

This preliminary stretching may appear quite an easy performance, but in reality it is the most complicated of all, and when this becomes easy of accomplishment, all difficulty of balance will have disappeared, and the student will have a clear road before him, with the certainty of being able to perform the most intricate changes of movement with the greatest ease.

Here, then, are the detailed instructions for obtaining this Preliminary Position:

Begin by placing the feet close together, so that the heels and the whole of the inside line of the feet are touching, the weight of the body well forward over the ball of the foot. Although the heels may just touch the ground, there must be no weight on them. The arms should be drawn down to their full length at the sides, with fingers pressed together but fully extended. Now, lift the chin (but without pushing the neck too far back on the spine), and raise the head well up from the shoulders by drawing the neck muscles up to their full stretch. This movement is followed by the pulling up of the waist muscles with a simultaneous downward stretch of the arms to prevent hunching up the shoulders. Great care must be taken not to contract the diaphragm unnaturally by holding the breath while stretching it. Any check on the breathing produces rigidity, and therefore the stretching of all muscles into this condition of Tension must be done in such a way as not to interfere with the free movement of the lungs or joints. The pulling up of the waist muscles really constitutes a drawing up of the body away from the legs, as it were, which should make the counter stretch downwards.

On the accurate performance of this movement of the diaphragm depends the perfect balance of the whole body when completely tensed. When any loss of balance takes place, it is invariably at the waist, and the appearance of the average modern human being when making the least effort at special balance is that of having a great deal too much "top hamper," which graphic expression best conveys my meaning. Here, as I said before—in the middle of the diaphragm—is placed the dynamo which sends out the current of Tension the moment the muscles are stretched enough to receive it. Here also lies the centre of gravity, the immovable point from which all movement should radiate. It is interesting to notice that when this part of the body is under perfect control, movement in water becomes a thing of extraordinary beauty and ease, depending as it does almost entirely on the muscles of the diaphragm —a little twist, a bend, a straightening of the waist, and the rapid gliding turn of a fish is the result.

In walking, the complete immobility of the diaphragm is required owing to the fact that the support for the whole body, during movement, is the foot; in the water, on the other hand, the weight is distributed equally over the whole surface of the body, and the centre of gravity is free to radiate movement in all directions, having no longer any weight to be controlled on one point as base.

The next movement which follows the upward stretch of neck and waist, and the forcing downwards of the arms, is the bracing of the knee muscles. This should be effected by a definite movement of pushing the knee-cap back as far as possible. This draws up the muscles directly behind the knee to their full stretch from the heel. The foot muscles are now the only ones remaining unstretched, and this should be done by rising well up on to the ball of the *toes*, so that the whole strain of the tensed body comes on the spring underneath the instep, which should be raised so as to form an acute angle with the ground. On this acute angle spring the whole weight of the balancing body should play when in complete Tension. The correctness of the position when all these movements have been completed may be tested by standing in profile before a mirror. If the balance is perfect, it will be possible to draw an imaginary line from behind the ear, passing through the shoulder, hip and the knee, and ending at the ball of the foot just behind the toes. Plate XII. will, I hope, render the explanation perfectly clear. In the profile photograph, the vertical line test may be applied, when it will be found that it passes through all the points named.

# PLATE XII.

A B C D

 1 2 3 3A

Preliminary Position.

Plates XII.[A] and XII.[B] show an alternative method of arriving at the full-waist stretch for those who find the method already explained too difficult. The effort of trying to reach at something high above the head is in many cases a help; and, after having stretched the waist as much as possible by these means, the arms should be lowered to a horizontal position, for an instant, and finally brought down to the sides, great care being taken not to let the muscles of the waist collapse with the lowering of the arms. Plate XII.[C] is the completed position taken full face, Plate XII.[D] is the same in profile, and is the best for careful study of detail.

After what I said about heels in the first chapter, it seems hardly necessary to repeat that during the performance of all exercises, either very thin-soled dancing sandals should be worn, or no shoes at all.

An effort should be made, when in this Preliminary Position, to rise several times on the toes, great care being taken to keep the rest of the body absolutely immobile, so that the rise and fall may be in a strictly vertical line, the movement being made by the acute angle spring of the instep.

# CHAPTER IV

## THE FUNDAMENTAL PRINCIPLES OF MOVEMENT

HAVING placed the body in the right condition for definite exercise, I shall now explain the principle on which the movements are based, a principle so purely mathematical that it applies not only to the special set of what I shall term basic exercises, but to all movement, however simple. It will therefore be necessary, before giving a detailed explanation of these exercises, to make a short analysis of movement in general.

Roughly speaking, one may divide movement into two distinct types, which I shall call disconnected and sequential respectively. These different types of movement produce entirely different results both physically and psychologically. It is with sequential movement alone that the exercises which follow are concerned; but in order that the point of contrast between the two may be defined, I shall first explain what I mean by disconnected movement. This may be formed of a series of different positions with pauses between them. The pauses need not necessarily disorganise the series, but the fact of being able to stop between the successive positions allows their performance to become purely mechanical when once they have been practised separately and become easy of execution. Such movements consist almost invariably of the flexion and extension of the muscles of different parts of the body in turn, and are necessarily very limited. The check between each position, whether for a long or short interval, produces a corresponding break in the attention, during which it is possible to think of other things. This is the result of all movement which, with a little practice, may become mechanical.

Sequential movement, on the other hand, presupposes a following-on, an uninterrupted continuity. If this is broken in any way the sequence is destroyed and a recommencement from the beginning is necessitated. It is impossible for sequential movement to become mechanical, on account of the extraordinary type of concentration needed to perform a number of varied movements with unbroken continuity—a concentration that obliges the mind to pass rapidly from one point to another with unhesitating certainty, while yet retaining a clear idea of the sequence as a whole. In these two types of movement—disconnected and sequential—we get the physiological analogy of habit and interest; habit being represented by all that may become mechanical, and interest by all that involves thought-initiative. And in habit and interest are found what Professor Baldwin so aptly describes as the "psychological poles, corresponding to the lowest and highest in the activities of the nervous system." Sequential movement involves a smooth, unchecked following-on of many changes of position, regulated by a balance perfect enough to produce definite rhythm, and these changes of position are not arbitrary, but are necessarily related, and involve a tense connection with the centre of gravity, without which there must always be a great waste of force through conflicting strains.

On accurate balance, then, depends the economy of force which, in movement, expresses the greatest beauty, giving as it does an appearance of ease and lightness obtained by the equal distribution of weight over perfectly-tensed muscles, so that the centre of gravity is exactly over its base. It is comparatively easy to keep the centre of gravity over its base when the body is stationary. The difficulty arises when the weight begins to move, and the base has to be constantly changed.

Take, for example, the simplest of all sequential movements—walking. The act of passing the weight from one foot to another results as a rule in an effort to feel forward for a new base before allowing the main weight of the body to trust to it, thus producing the jerky movement that gives the impression of a leg at each corner, so to speak. The way to avoid this jerky movement in walking is to carry the whole weight forward at the same time as the advancing foot, which can only be done if the whole body is in the condition of elastic tension already described. The law of rhythmical movement which gives the ideal poise requires that the centre of gravity of a moving weight should be kept *constant* over its base. Hence the enormous importance of a reliable base and the care required to avoid distortion of the feet. The observance of this law reduces to about half, the effort necessary in walking, while it increases to nearly double, the pace at which the ground is covered. This acceleration, under conditions of perfect balance, forms the strong point of contrast between sequential and disconnected movement. All disconnection means angles; angles imply resistance; and resistance involves reaction, which results in the loss of exactly half the force, according to the dynamic law that action and reaction are equal and opposite. Disconnection, therefore, expresses the Finite thing. Continuity can only be expressed by curves. Sequential movement, by being circular, is capable of extraordinary acceleration by reason of its non-resistance, and thus represents the maximum force. Sequential movement, therefore, expresses the thing that is Infinite. Perfect sequential movement—by which I mean that which maintains a perfect equilibrium throughout—can only be performed in the condition of complete Tension already described. This, it will be remembered, involves the linking together of all the muscles at full stretch. The more complete this linking together, the less visible becomes the effort, so that the highest degree of Tension, although representing the most complicated vibratory movement of all the muscles, is the only condition in which perfect stillness can be maintained. The fact of having reached the climax of the combination of many positives results in the stillness of apparent negation; as, for example, the vibratory combination of many coloured rays produces light, which is colourless.

In connection with this idea of movement becoming invisible when it is the result of combined and perfectly-balanced effort, the late Edouard Rod once wrote a description in the *Figaro* of the Temple of Neptune at Paestum, in which he expresses very beautifully in its application to architecture the idea of movement becoming invisible when it is the result of combined and perfectly-balanced effort:

"Il est très fort, mais d'une force assez sûre d'elle-même pour s'apaiser, et pour arriver à la grace, la vraie grace, qui n'a rien à faire avec la débilité . . . Il n'est que de la force amincie, encore plus acquise et plus intrinsèque puisqu'elle devient moins visible." . . . More inherent, more real, as the effort becomes less visible. This is the ideal strength; and the basic principles of the finest architecture are the same as those which govern human movement, viz., the power of *lift* and expansion on a reliable base.[1]

When once these principles are clearly understood, they may be applied, not only to definite exercises, but to all sports, as also to the unconscious everyday movement of life, with the certainty of finding a more complete order of activity, a stronger current of force, a new power of control.

In selecting and systematising different series of sequential movements which shall be perfectly natural, one turns instinctively to those needed in imaginary attack and defence, not only on account of the great variety of these positions, but because of the rapidity with which they must be performed. The origin, then, of all

[1] Michael Angelo maintained that, to an architect, a knowledge of anatomy is essential.

physical training is *war*. Among primitive peoples, it was necessary to be always on guard against sudden attacks. For this reason, during times of peace, they practised at first a sort of mimic war, which gradually developed into a sport. The Greeks ascribed the invention of wrestling to mythical persons such as Palaestra, the daughter of Hermes, and to Theseus is given the honour of having been the first to reduce the sport to a game, with well-defined rules, and thus to have made an art of wrestling; whereas before his time it consisted of the most brutal fighting, in which the strength and weight of the adversary alone decided the victory.

In the mimic battles of the Spartans, they frequently lost eyes and ears, which tortures they accepted as the necessary sacrifice in return for the indomitable fortitude which they acquired.

At a later date, the system adopted by the Athenians had for aim beauty of form and line, and grace of movement, and no competitor was awarded a prize unless his performance had been gracefully as well as effectively achieved. Contest by wrestling was divided into two branches by the ancient Greeks. The first was the "Palē Orthē," the upright wrestling. The second was called "Halendesis" or "Kylisis," in which the athlete wrestled with his adversary on the ground. The "Palē Orthē" was the only kind of wrestling practised in Homeric times, and also later on in the National Games of the Greeks. The rules provided that on the fall of an athlete his adversary should allow him to rise and resume the contest if he wished, but if he fell three times, the victory was decided in favour of the other. There were also preparatory exercises called "Analeinemata," exercises which were looked upon as of the greatest importance, since through them alone could the athlete acquire that tense elasticity of muscle necessary for the extreme rapidity required in actual wrestling.

It is, then, natural to suppose that the preparatory movements represented as nearly as possible the actual positions taken in wrestling, so that by continued practice the pupil might arrive at the unhesitating certainty and precision needed in the varied changes of position of real contest.

Antique Art gives many examples of this extraordinarily rapid form of wrestling by tripping. It appeared many centuries later among the Chinese, brought back probably through their intercourse with the Persians. The form of wrestling called Jujutsu, practised by the Japanese of the present day, is, I am convinced, a survival of the "Palē Orthē" of the Greeks. The collection of tracings on page 39, taken from Professor Krause's book "*Hellenika Gymnastik und Agonistik,*" show the close resemblance of some of the Japanese throws used in Jujutsu, to those of the Greeks. No. 1, especially, is identical with the Koshinage shoulder throw, in which the thrower drops on his knees after having hoisted his opponent upon his shoulder. This throw can be given standing or kneeling, but the latter position is much more disastrous to the victim. No. 2 is obviously the

Koshinage hip-throw, as used in Jujutsu at the present day, and No. 4 has a very close resemblance to the Japanese "Shimoku," the position of the attacker's left hand being the only essential difference, while he is practically erect, instead of crouching on bent knees.

Fig 1.

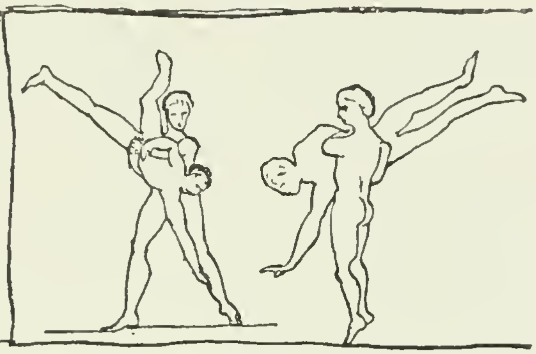


Fig. 2.

Fig. 3.

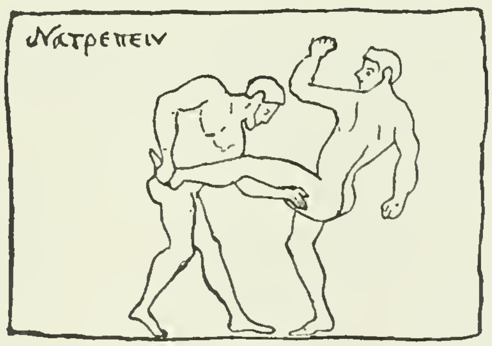



Fig. 4.

The "Palē Orthē" was introduced into Japan by a Chinaman about the third or fourth century, under the name of "Jujutsu," and remained a jealously-guarded secret known to and practised by the Samurai nobles alone, until comparatively a few years ago—in 1860, I think—when the general public were allowed to learn. With the strange liking of the Chinese for all that represents the grotesque in movement, they neglected, and eventually completely lost, all the grace and beauty esteemed by the Greeks as indispensable, and retained only the dramatic and practical sides of wrestling, the genuine self-defence, which, among the Greeks, was subordinated to beauty.

It is, then, upon the preparatory movements that I place such immense importance, and it was during the study of all the rapid changes of position in this "Palē Orthē," which demand such exquisite balance, that I found for myself the Law of Balance in movement, the application of which allows of the greatest rapidity and force with the least expenditure of energy. This law, as I have said, requires the centre of gravity of a moving body to be kept exactly and continuously over its base, an impossible achievement except under the condition of Tension already described.

# CHAPTER V[1]

## THE APPLICATION OF MATHEMATICS TO HUMAN MOVEMENT

IN the last chapter I spoke of the different movements of the exercises as being necessarily related to one another, bound by certain laws which allow of no arbitrary change.

Movement which is bound by law becomes geometrical, and geometrical law makes it impossible to vary the formation of a curve beyond the limits of difference in size according as the relation between the curve and its pivot is altered.

The centre of gravity of the combined curves produced by the movements of human limbs in space is the same as that for each individual curve, for the reason that the connection of each limb takes place at the same spot, viz., the centre of gravity of the main weight through which passes the axis of balance. When this vertical axis is in perfect equilibrium the limbs form the varying radii of a common axis, and the law which governs the mass governs each part; therefore the centre of gravity of the combined mass of curves is the same as for each individual curve, and is found in the vertical axis through the pivot. As long as this remains stable, the curves described by the

[1] In connection with this chapter, I would like to state beforehand what will doubtless be apparent, that I have never been taught mathematics. It is written for the average reader, for whom I hope it will present no difficulty or ambiguity.

moving limbs are true, that is to say, they submit to geometrical analysis. I conceive a true curve to be one which is projected in regular and proportional sequence with relation to its centre. The radii of a circle are equal in length, and it is a true curve. A true curve may also be one whose radii vary in length with regular sequence. A false curve, to me, would be one whose radii have been subjected to irregular variation.

In preference to the word "pivot" I would like to use the expression "axis of balance," as giving a fuller conception of centre of gravity in space than is represented by a pivot on a plane surface.

The axis of balance is the vertical line through the pivot about which the object turns, so in the case of the human being we will assume that it is the vertical line already mentioned from the centre of gravity of the main weight both upwards and downwards to its base, which latter constitutes the pivot, viz., the only point of *weight* contact on the horizontal plane. I specially use the word "weight-contact," because, although curves formed by the changes of movement of a human being come into occasional contact with the ground, there is no moment when any of the weight suspended over the pivot is transferred to the moving limb, which merely touches the ground from time to time to mark the points of angles formed in the course of changing direction.

The position of the pivot itself can be altered from time to time, thus varying the direction of the curves, but this variation of direction in no way falsifies the curves themselves, which are dependent only on their axis. Only when the axis itself vacillates do the curves become untrue; that is to say, when it has lost *tense* connection with its curve-making limb through the strain necessitated by the maintenance of balance under a false equilibrium.

Given this connection under inalterable conditions, the pivot itself may describe continuous and independent curves simultaneously with the moving arm and still govern those arm curves, provided the connection between the two is allowed freedom of movement.

Some intensely interesting discoveries were made in this subject a few years ago by Colonel Hippisley, R. E., who gave a lecture at the Royal Society in 1904, at which he showed numerous complicated designs illustrating the extraordinary unexpected figures produced by a moving arm whose pivot was itself travelling round an ellipse continuously.[1]

He constructed an instrument in which one small wheel was fixed to a horizontal bar, which at one end held the point or pivot which was made to describe an ellipse. The movement of the vertical pivot point was continuous, and the movement of the following wheel at the end of the bar was free as far as lateral play on its guiding pivot was concerned; but according as the bar itself was lengthened or shortened, so did the curves of the following wheel vary, and the designs formed become more or less complicated.

[1] I am indebted to Colonel Hippisley for the privilege of being allowed to reproduce for the first time three of his designs.

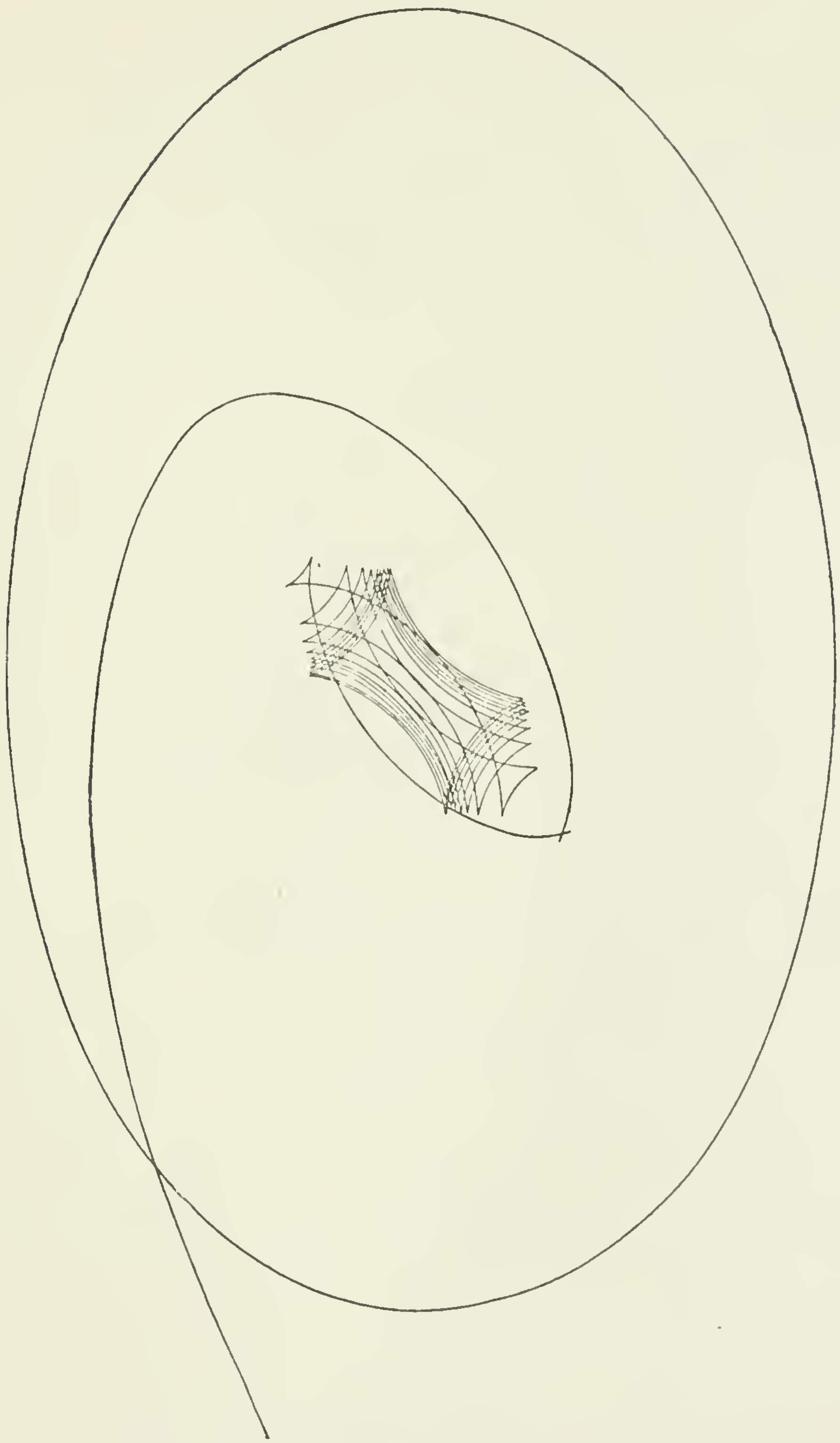
Colonel Hippisley eventually discovered a certain ratio between the wheel and its pivot which produced curves that ultimately repeated themselves over exactly the same lines, so that they became changeless and endless.

The variation of a hair's breadth in the length of the bar produced completely different curves; and in all designs except this particular one of the repeating curves, the wheel eventually ran out of the figure altogether.

Colonel Hippisley has most kindly allowed me to reproduce three of these geometrical figures. Plate XIII. shows the one in which the curves become changeless and endless. Plates XIV. and XV. show the result of alterations in the length of the bar, where the following wheel, after numerous complicated gyrations forced upon it by the track of the guiding pivot round the ellipse, runs out of the figure at a tangent. As regards the solution of the problems which his own genius has discovered, he says that mathematical difficulties prevented the complete analysis of the curves from being set out.

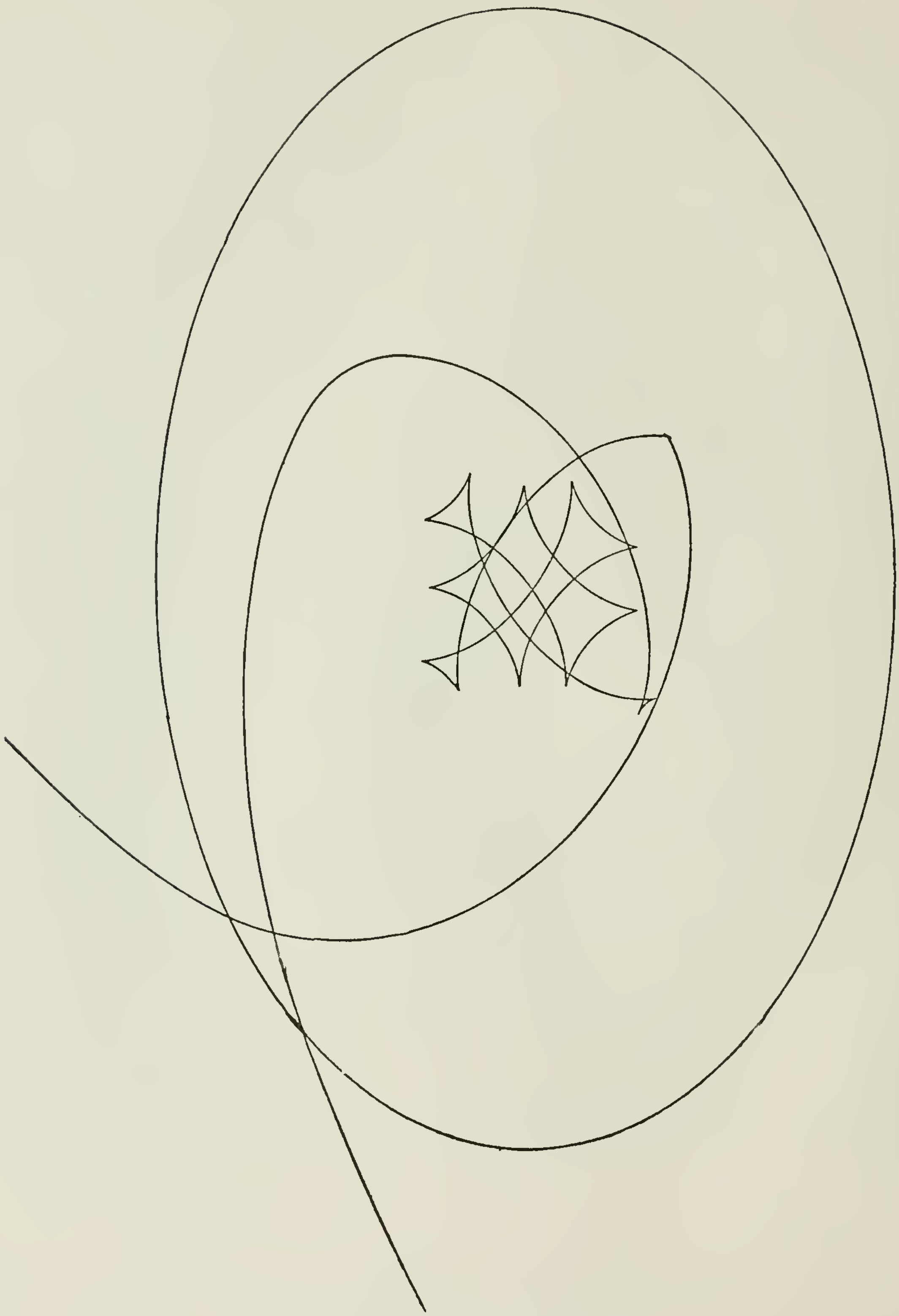
And so these wonderful and exquisite designs remain in a drawer for some future Euclid to elucidate. There seems some possibility that the elucidation might be of service in astronomical calculations, where the ellipse would appear the most frequent form of planetary movement; and the idea presents itself of some unknown centre of gravity operating on an immense scale upon the whole system of worlds, forcing upon each, according to its distance from that centre, gyrations from which it cannot escape any more than can the following wheel

## PLATE XIII.



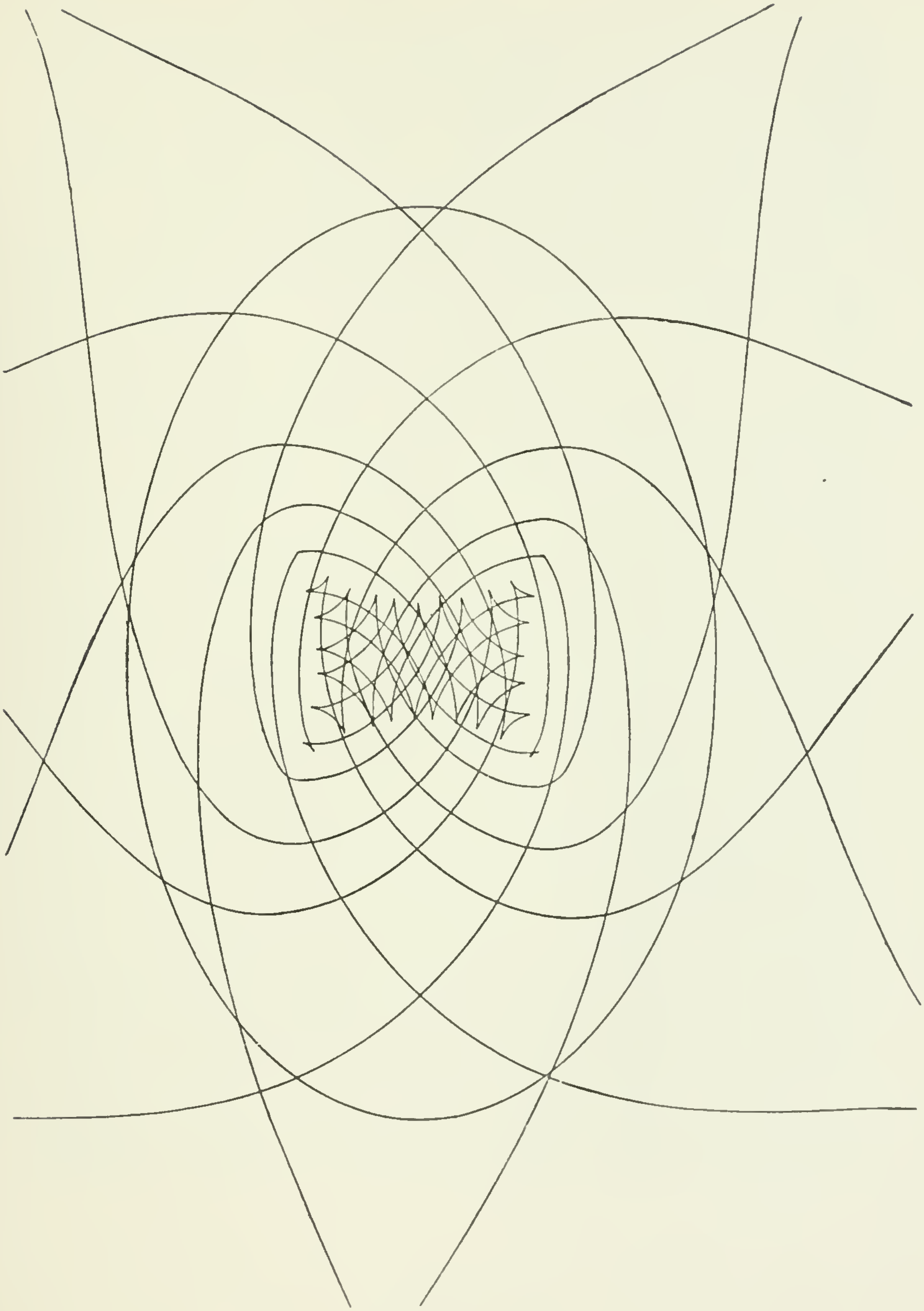
Curves which ultimately become changeless and endless.

PLATE XIV.



46 Diagram showing lines of entrance and exit.

## PLATE XV.



A complicated puzzle.

of Colonel Hippisley's little instrument from its guiding pivot. It may be wondered why I have mentioned this discovery of Colonel Hippisley's in connection with my own geometrical movements, and the general opinion will be that it has no bearing whatever on my subject. Colonel Hippisley himself writes to me as follows:

"So far as I am aware, the centre of gravity of the curve does not exercise any *rôle* in the theory, as it does in yours. I mention this lest you should be led to assert some such connection in your book. If you remember, what interested you in my curves was the *psychological* fact that the nearer the follower was to its guiding star, the more closely it followed in its footsteps, which is a little parable from Nature. Or, rather, a parable from a much dryer subject, to wit, Mathematics."

In connection with the last paragraph, I would class all parables from Nature as one with those found in mathematics, since all Nature's laws are based on the same principles, and all her different manifestations are merely varying expressions of these same fundamental laws. If I say that the force which governs my geometrical movements is that which makes the trees grow upwards, and which holds the stars in the firmament, I shall be accused of talking nonsense. It is, nevertheless, true; only, instead of making the statement to start with, I am endeavouring to show that by placing the human being in a condition whereby he is brought into stride, as it were, with the universal law of rhythm and harmony, through equilibrium, he is enabled through his finer and more sensitive physical development (which comes as a natural result of obedience to essential law) to come into direct connection with vital force itself, and share in far-reaching reactions which find no limit in the physical world; while at the same time the physical expression of this vital force is made visible through movement, which is able to demonstrate the immediate relation between the two, and which, so far as I have been able to prove, operates solely in the vertical plane.

All movement, then, which is geometrical, is bound by mathematical law. The difference between necessarily related and arbitrary changes of movement is, that the first are inevitable and interdependent, while the second are the expression of an individual will, subjected to alteration at random. The two types of movement may be compared in the case of arbitrary change to freehand drawing, while that bound by mathematical law represents geometry, which, when repeated time after time, under the same conditions, shows barely a hair's breadth of variation. I do not wish to imply that arbitrary changes may not be both pleasing and interesting, but only that *as curves* they cannot be *true*, performed as they must be without a controlling principle. In the extraordinary precision of law-governed movement lies its beauty; in its economy, not only of force but of elaboration. Complexity there may be, but of an order so defined that the mind is able to visualise design in clear-cut perfection, free from all that is superfluous or inessential.

This definition gives even to the most complex movements an appearance of great simplicity and ease: simplicity, because each movement is so right and true that it is a complete thing in itself, while yet it is an indispensable part of the whole, and the mind is left undisturbed by any feeling of uncertainty: ease, because through this precision the fatigue of vacillation is absent; there is no expenditure of force on the superfluous, because the superfluous no longer exists.

Physical force, as generally recognisable, seems held in abeyance, while that which becomes visible is the energising will which enforces the calm certainty of every detail. The whole value of geometrical design as represented by the movement of these basic exercises lies in the proof it affords of the truth of the fundamental principle which governs them. They represent a highly complicated system controlled by a single principle, yet capable of manifold application.

My first attempt to render in design the movements of each exercise proved sufficiently interesting to make it worth while to obtain some proof which should be incontrovertible, for although the freehand drawings I first made were actually accurate as to design, they could only be proved so by one who knew the movements as well as myself. The only definite proof then was photography, and it is once more to the Institut Marey, to the generous help of Professor Richet, and to the untiring genius of Mons. Lucien Bull that I owe the proof I was eventually able to produce.

What I wanted was the effect of white lines on a black ground, and how to get them was the problem. It was eventually solved by taking photographs at night, with tiny electric bulbs attached to each foot.[1] The first attempts were made with lights on the arms and head, as well as on the feet, but the complication of movement in the two planes made the curves so intricate that eventually all lights were eliminated except those on each foot. The designs therefore represent the leg movement *only*, on the horizontal plane, and some idea may be formed of the intricacy of the complete movement when that of the arms is added, which latter is almost invariably on the vertical plane. Not only this; the camera being about thirty feet in a vertical line above my head, rendered all curves in that plane either distorted, or represented as straight lines merely. Two prints of each negative are given. The first, marked *A*, is the untouched print, as it comes from the cliché, in which most of the curves are broken at some point or other. This is due to the passing of the foot so closely under the body that its light is obscured from above. This was, of course, impossible to avoid, but as it renders the definition of the design in some cases

[1] As no photographs of the kind have ever been taken in the horizontal plane, we were much puzzled as to what name to give the "procédé."

Professor Marey, in his experiments with "points brillants" in the vertical plane, calls the method "La chronophotographie géometrique" or "La procédé des points brillants."

Mons. Lucien Bull, however, suggests what seems a more correct and simpler description of the method. "Enregistrement optique"—or, in English, optical registration—conveys a very clear idea of the particular photography, which gives geometrical proof of my theory, and therefore I shall appropriate this definition for the special process we adopted.

somewhat difficult to follow for everyone except myself, I have in each case shown a second print in which all the curves have been completed, as also the straight lines. This second print is marked *B*. The curves represent the dynamic action of the moving foot; the straight lines show the alteration in direction of the pivot foot on which the whole weight of the body is maintained. The white spots indicate the pauses between two movements, where the toe touches the ground for an instant, marking the accentuation of the varying angles, but the curves themselves are, without exception, described in space. Besides the two photographic prints, I have drawn a corrected geometrical version of each one of the series, for the purpose of rendering the design more clearly as pattern, and in giving the key to the movement of each design, the geometrical version should be followed, as on these will be found the little arrows and lettering which indicate the movement of one sequence of a series, and the comparison with the original prints will render these perfectly clear. The geometrical version of these prints demonstrates in a very striking manner their resemblance to some of the oldest known designs, which for thousands of years have been associated with mystic interpretation. Take, for instance, Plate XVI. This is the design represented by Exercise IV.,[1] and is none other than that used by the Chinese, Hindus, and Egyptians thousands of years ago to represent Eternity—the thing that is Infinite. In the actual photo-

[1] A detailed description of all the exercises will be found in a Supplement at the end of the book.

graph of this design, Print *A*, it will be noticed that the two large outer curves do not come back into each other's orbit. This was a fault in my movement which however I have left, as an illustration is often clearer through its faults than its perfections. If you will turn to the description of Exercise IV., you will probably see at once what went wrong in the movement of an otherwise very fine curve.

In the outward swing of the moving leg, the foot came to the ground before it had been placed exactly under the centre of gravity of the body. Had it been brought in a few inches farther before being placed as base, it would have made a curve that would have merged into the orbit of the other leg movement when the exercise was repeated on the opposite side. I have rectified this in the geometrical version, showing the completed and corrected curve.

At a lecture in Paris where I showed these designs for the first time in January 1911, they created some little sensation among those of my audience interested in occult science, as having a probable connection with those of the Rosicrucian Mysteries, and also with other symbols of far older origin. It is both interesting and curious that any complete exercise should represent so exactly the ancient symbol of eternity, except that both the small thing and the great thing are governed by the same principle, and it may be that the infinitesimal example of what may be demonstrated by human movement is one of the manifold applications of the fundamental principles of which I spoke. The elaboration of design, conceived from human movement in a perfect condition of equilibrium, would undoubtedly form a reliable basis for that used in architecture, in which lift and expansion on a firm base give to the curves of a Gothic arch the actual appearance of harmonised movement; so much so that one lifts to the sight of them, while the lungs expand in deep spontaneous breaths. I use the word "harmonised" movement here, in its original Greek sense, meaning balanced; harmony representing originally a fastening, a key-stone. Homer used the word by its different meanings. "It is by the aid of wedges and 'harmonies' of some sort that Odysseus joins his twenty trees together to form the raft whereon he sails away from Calypso's Isle." It also came to mean a mental union, or joining together, and later on an expression of Law and Order. Finally, it is used in music to represent the "linked sweetness" of sound joining sound.[1] It is in this sense that Homer uses "melody," as representing duration of sound, regulated by perfectly balanced rhythm.

By reducing the whole series of basic exercises to geometrical demonstration, it has been possible to prove the truth of their underlying principle. The combination of force, equilibrium, and beauty is the result of that principle; beauty in movement being the outcome of the economy of force which is the direct result of a perfect equilibrium. Control over the expenditure of effort; reserve of expression; these are only possible under a condition of perfect balance.

[1] "Makers of Hellas." E. E. G., p. 103.

# PLATE XVI.

A

B

*Copyright.*]

Optical Registration of Exercise IV.

Looking again at Plate XVI., it will be seen that the two central curves are not vertical to each other as they should be; that is to say, the upper one is on the slant, although the curve itself is quite true. This was the heel movement in the second exercise, viz., the repetition, and it will be seen that on the return journey I did not land quite in the right spot, judging from a vertical bisecting line, although the horizontal is correct. The photographs of the whole series are the first and only ones which have been taken, and many faults are apparent; but as these in no way detract from their value as demonstrations, but, on the contrary, make it rather easier to explain their meaning, I have left them untouched. Later on, I hope to make another series, in which most of the faults apparent in the first examples will have disappeared. The key to the movement of Plate XIX. is given on Plate XVII., the geometrical version, and is as follows:

*A* is the starting-point of both feet, from which the right foot takes a step back until the heel is on the spot on the line between *B* and *C*, and is marked "heel pivot." The toe of the right foot should be touching *B*. The small curve from *B* to *C* is that formed by the toe-light of the right foot, while pivoting on the heel, and is marked with arrows to show direction. The large curve from *A* to *D*, also marked with arrows, is that produced by the left leg movement as it swings out wide from the hip, carrying the whole body round on its pivot heel. The dotted line from *D* to *C* represents the line of recovery of the left foot during the spring back to an erect position close to the right foot, but had the curves been quite correct this would not have shown. As it is, it elucidates the movement admirably.

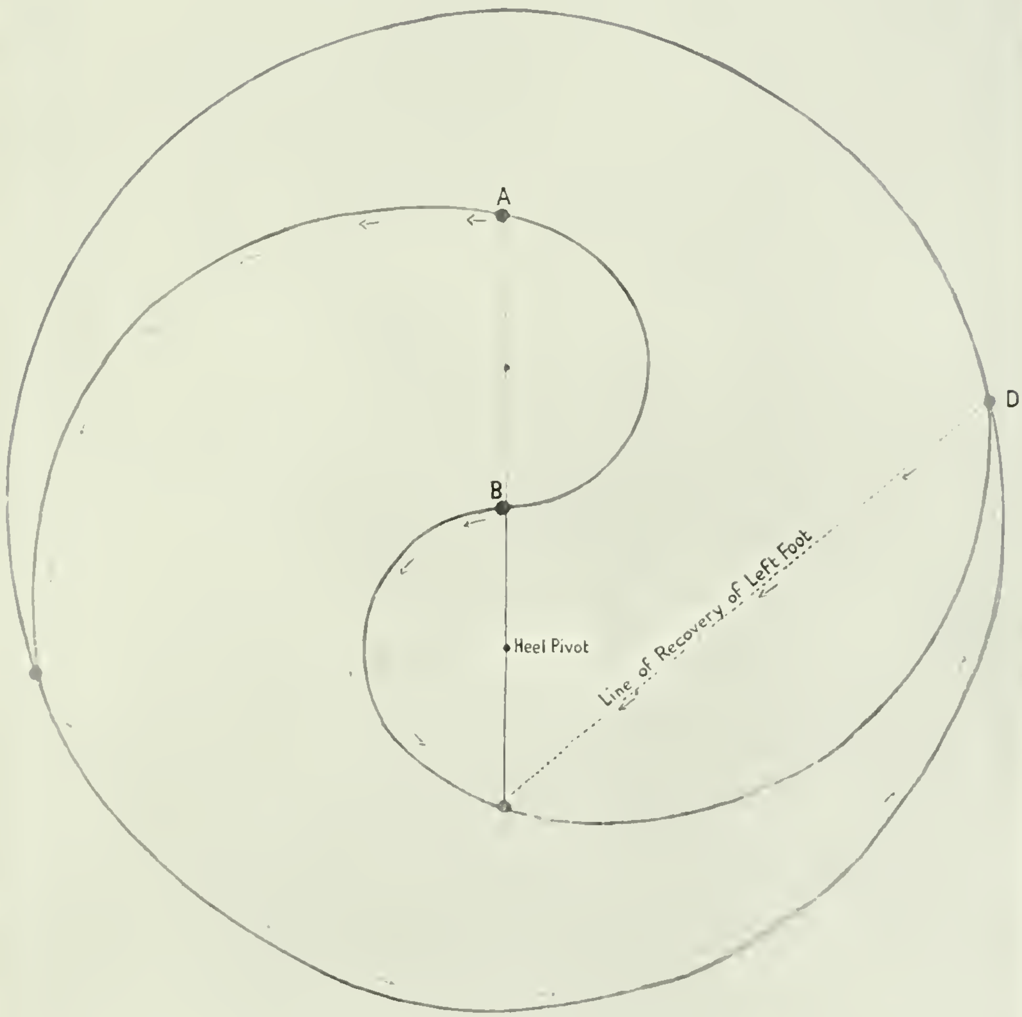
It will be remembered that two repetitions of this exercise are needed to form the design, as each one completes a half-circle, and it will therefore be simpler to reverse the diagram when following out the movement of the repetition, which, it must be remembered, begins with a step back of the *left* foot.

Now look at the little constellation formed by Exercise III., shown on Plate XVIII., *A* and *B*. How organic are the curves—they might be a chart of Jupiter and his moons showing their separate orbits!

These curves are all archimedean in form, though the whole constellation gives the impression of circles. And, indeed, the group forms, with its outer curves and spots, both a perfect circle and a perfect square, while an equally perfect square and tiny circle are formed in the centre. It will be noticed that there are four prints on this plate. *C* and *D* are two prints from a different negative, in which one movement was eliminated for the purpose of leaving the centre clear and thus affording a clearer definition of the curves. This will be described later on.

Refer now to the geometrical version on Plate XIX., and, bearing in mind the exercise itself, take *A* as the starting-point of both feet. From *A* to *X* in the centre represents the first lunge of the left foot, which stays at point *X* with the whole weight upon it, and *with well-bent*

PLATE XVII.






Geometrical Version of Plate XVI.

*knee*, a position important to remember as it causes the special formation of the curves. The wide, sweeping curve of the right foot as it comes round on the *gradually straightening* left knee, is represented by arrows going towards, and stopping at, point *B*. It will now be seen that the upward rise of the left knee transforms what would have formed an arc of a circle into an archimedean curve, and as, in its narrowing circle, it passes in front of the body, turning it into a right angle to the first position, the tip of the toe comes to the ground at point *B* and the curve is finished. The movement now becomes a backward curve of the right foot, performed in exactly the same manner as the first, and represented by arrows going towards and stopping at point *C*. But this time the curve is performed on a downward bend of the left knee, so that the descending curve widens as it progresses, and finally arrives at point *C*, where it forms the inward curve of the next angle, and so on through the four repetitions. The four lines radiating from the centre show the lunge and recovery of the left foot; forwards and backwards each time as the exercise is repeated at the four angles, and it will be noticed how accurately the dots are placed denoting the pauses at the culmination of each upward curve, considering the complication of the repetitions. They are almost exactly mid-distance between each pair of straight lines. The little circle of dots in the centre, which is complete except for the eighth dot, forms an infinitesimal octagon, outlined by the movement of the ball of the left foot, which, to each right-angle turn of the body, makes two acute-angle movements. The two prints *C* and *D* are those of the same exercise, but with the recovery movement left out. This makes the whole exercise a series of curves on a rising and falling centre line, the base, viz., the left foot, being immovable except for the acute-angle turn, as each sweeping curve of the right leg brings the body round to a right angle. The small octagon formed by these acute-angle turns is barely shown, however, in these two prints, as the body remains almost entirely over the foot, there being no spring back of the recovery to disclose the left foot light, which is here shown only three times by accident. This exercise, in which the recovery movement is eliminated, forms a wonderful test for the tendon Achilles, which has to bear the greatest strain; for, after each swing back of the right leg, it misses the relief of the recovery movement, and is obliged to start immediately on the upward spring for the next rising curve. As in the case of *A* and *B*, four repetitions are needed to complete the figure.

The next photographs are those of a combination of Exercises VIII. and IV.,[1] and are shown on Plate XX. I leave it as a puzzle for those keen enough to decipher its curves. A correct solution is quite possible by the aid of Plate XXI., where the lettering and arrows will elucidate the first sequence of the series. It must be remembered that from *A* to *B* the step is taken backwards, followed by a left right-angle turn of the body, and a curved step with the right foot back

[1] For explanation, see p. 178.

# PLATE XVIII.

A

B

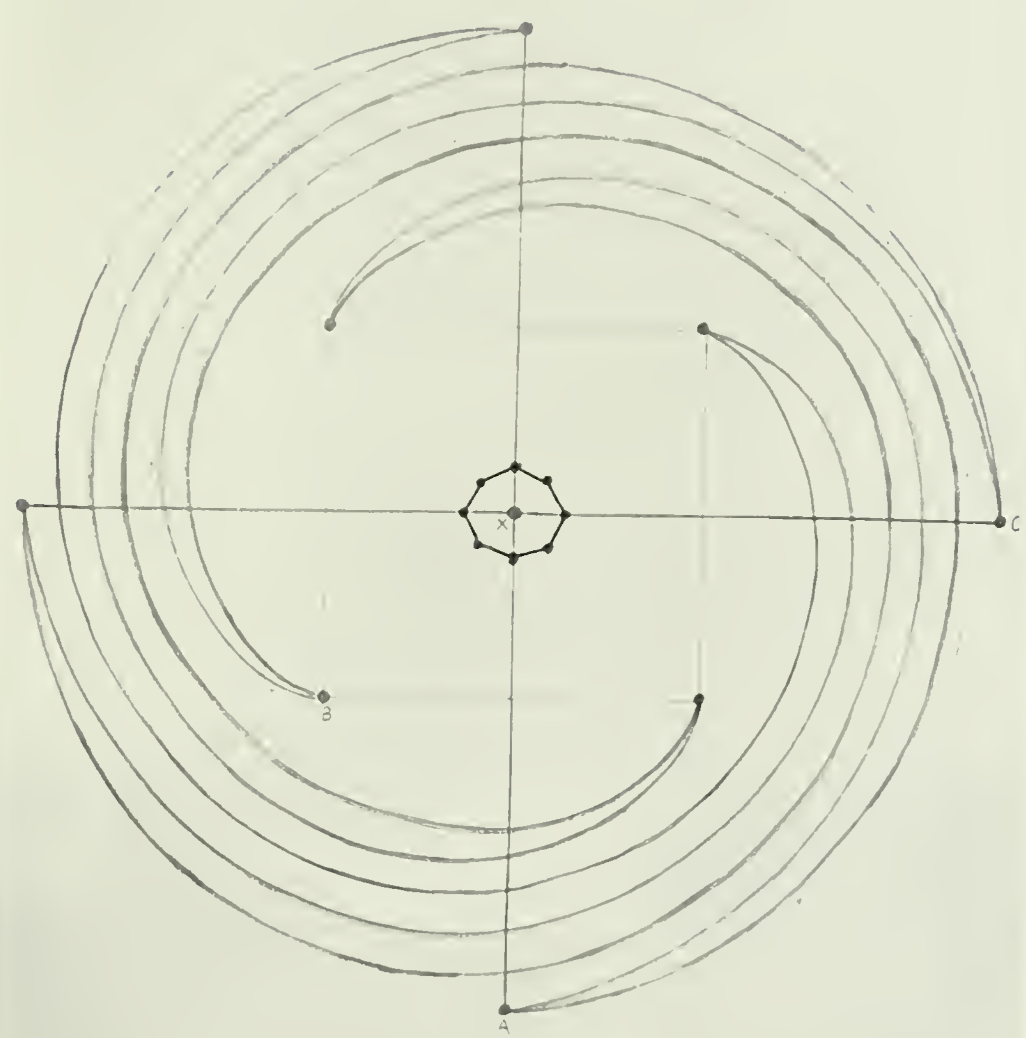
C

D



Optical Registration of Exercise III.

# PLATE XIX.






Geometrical Version of Plate XVIII.

to *C*. These two movements give the initial steps of Exercise VIII. The combination comes on the upward swing of the left leg, which, instead of returning to the right with a straightening up of the right knee, swings back in the long curve from *X* to *D*. I have marked the apex of the curve as *X*, as there is no pause at this point, and the leg comes back immediately in the long curve to *D*, while the right knee bends another two inches lower, as the arms swing round to the right. The recovery is, of course, to *D*, by bringing the right foot, which is at point *C*, back to an erect position at *D*, the body facing at a right angle to the first position. Three photographs of this exercise are given. The first two prints, *A* and *B*, are, as usual, two prints from the same negative, the one with corrected and completed curves. *C* is a print from another negative, taken shortly after *A*, and is shown here for the purpose of illustrating the extraordinary precision with which these movements are repeated. It will be noticed how infinitesimal are the differences between the two negatives *B* and *C*, even the wavering in certain parts of the curves being reproduced almost exactly, and were I to give a dozen different negatives of the same exercise they would show no more difference than these two.

It is interesting to note that a perfect circle is formed by the large outer curves as well as by those which seem to radiate from the centre. The large outer circle is more correctly traced in print *C* of this set. The geometrical drawing of this design makes a very good key to its solution. It must be remembered always that the straight lines indicate the changing direction of the body, while the direction of the arrows from point *A* shows whether the first step is backwards or forwards.

The next photograph, although a much more complicated design than the last, is Exercise VIII. by itself, and is shown on Plate XXII. The greater intricacy of design is caused by the repetition eight times of each sequence, which ends at an acute angle, whereas the combination of the two finished at a right angle. As the full description of this exercise is given in the Supplement, it is only necessary to refer to its geometrical counterpart on Plate XXIII., in which the first sequence is traced by arrows and lettering. What a beautiful design for a rose window this exercise would make!

The next design is that formed by Exercise VII., and is shown on Plate XXIV., an extremely simple little pattern, but one that may be frequently seen in antique architecture.

It must be remembered, in working out this design in movement by aid of Plate XXV., that the start from point *A* is made with the back to the centre, and that as the left foot lunges backward, it is placed at an obtuse angle to the start, which leaves the body itself at a right angle to the first position. Remembering this, it is easy to trace the movement of the right foot by the arrows. Tested by the compass, the square formed by the points of contact with the ground will be found perfect. The curves also are correct, and form perfect arcs of a circle, although they are not complete half-circles, for the reason

# PLATE XX.

A

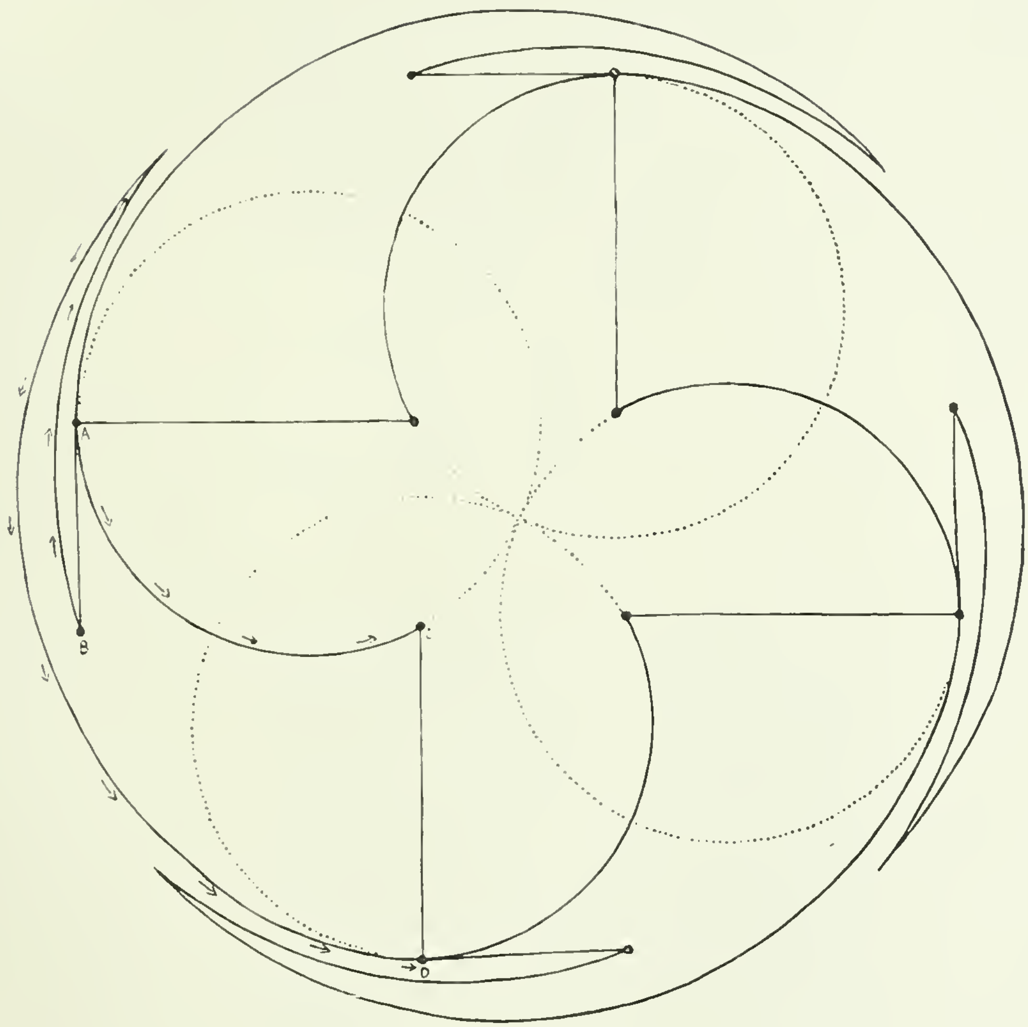
B

C

*Copyright.*] (*Different negative.*)

Optical Registration of the Combination of Exercises VIII. and IV.

PLATE XXI.

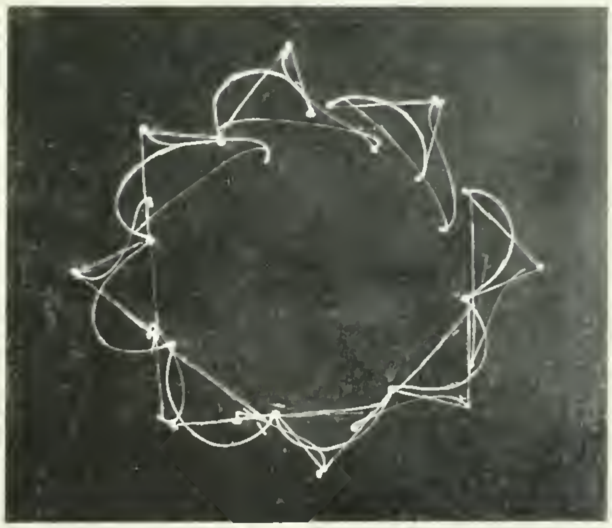



Geometrical Version of Plate XX.

# PLATE XXII.

A

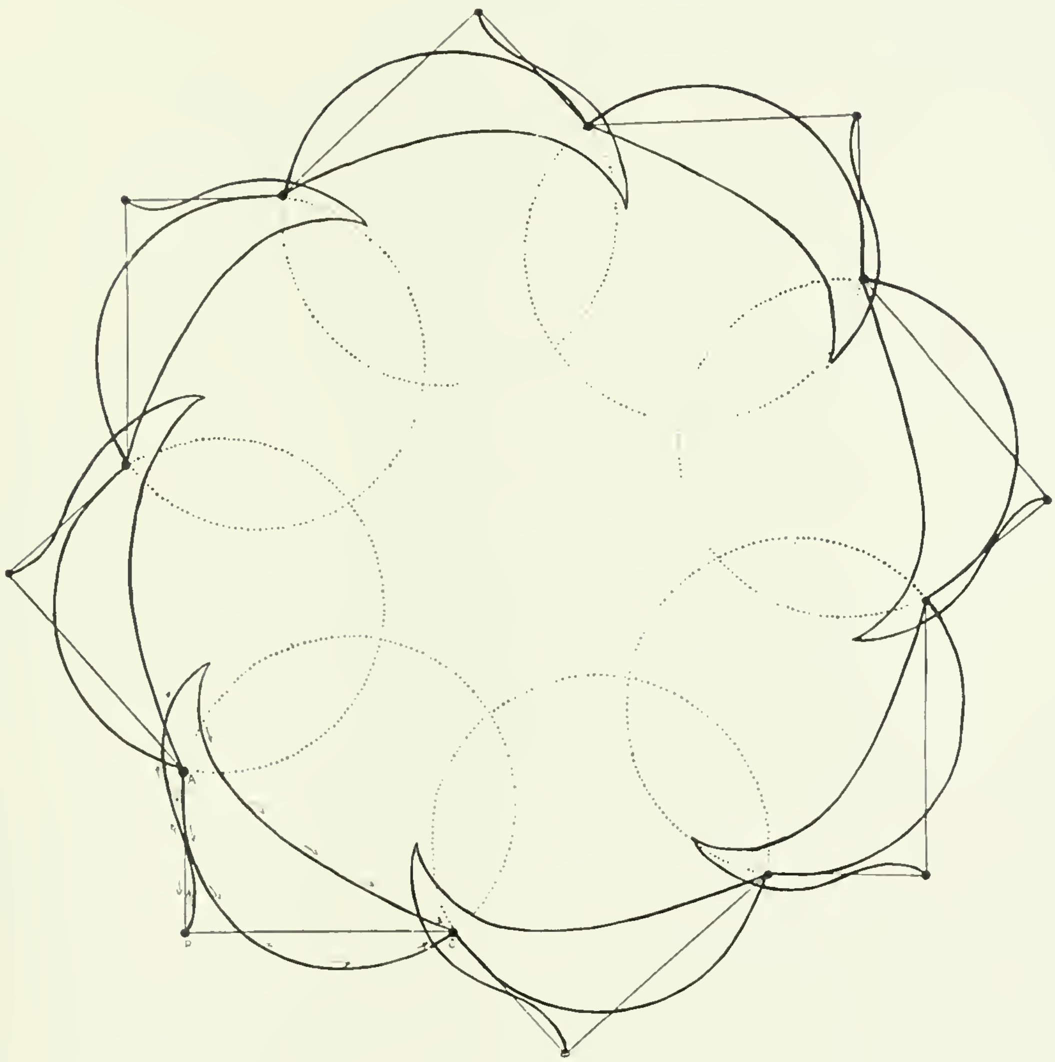
B



*Copyright.*]

Optical Registration of Exercise VIII.

# PLATE XXIII.





Geometrical Version of Exercise VIII.

that the left foot occupies the centre. The right foot is therefore obliged to make its curve at a little distance from the pivot; but, as the centre of gravity remains here, it is impossible for the foot to reach far enough to make the complete half-circle.

The design formed by Exercise V. as shown on Plate XXVI. is, from the point of view of pattern, by far the most beautiful. Look at its geometrical rendering on Plate XXVII. Another rose window, with its charming effect of a revolving star by reason of the outer points of its eight scalene triangles. Four prints of this design are given, the result of two different negatives. Prints *A* and *B* are in all respects the better negative, owing to the better definition of the angles, together with its extraordinarily perfect curves, while the octagon formed by the two basic points of the triangle is as good as that formed by the extreme outside points. If a diagram is made of this design, with all its points connected, and arcs completed, it forms an extremely interesting and beautiful geometrical figure. By aid of the detailed explanation, together with the lettering on Plate XXVII., the track from point *A* right through to *E* may be easily followed. When I say easily, I am thinking of those who have mastered the exercises by careful study with the photographs and Cinema details. Any attempt to work them out from the geometrical designs would be worse than hopeless.

The knowledge of angles formed by movement, and the power to connect them by perfect curves, must come from actual experience, and that experience will be the result of an increased sense-activity whose dynamic action has been trained and developed in the understanding of essential principles. But until the fundamental law of equilibrium is thoroughly understood and its principles are easy of practice, the designs will be about as much use towards acquiring a knowledge of balance as a geometrical theorem would be without a compass with which to work it out. The sole value I place upon them myself is the indisputable proof they afford of the correctness of the principle on which the exercises are based. What their connection may be with the secret symbols of antiquity would be extremely difficult, if not impossible, to prove, as no authentic description of the ceremonies through which the initiated had to pass has ever escaped the rigid secrecy in which they were bound. It would, however, seem not unlikely that at these ceremonies of initiation the novice would go through certain movements, and it is possible that these movements were afterwards represented by pattern, as being the best way to hide their real meaning. Just as, in the same way, the alchemists had a sort of code of secret signs to indicate the process by which the precious metals were mixed, together with the exact quantities required, and other details known only to themselves, and jealously guarded. But it is doubtful whether it has ever been realised that the human being, trained to the knowledge and practice of perfect balance in movement, may himself become the most accurate mathematical instrument! Otherwise a knowledge of the law needed as a means to this end would have made

# PLATE XXIV.

A

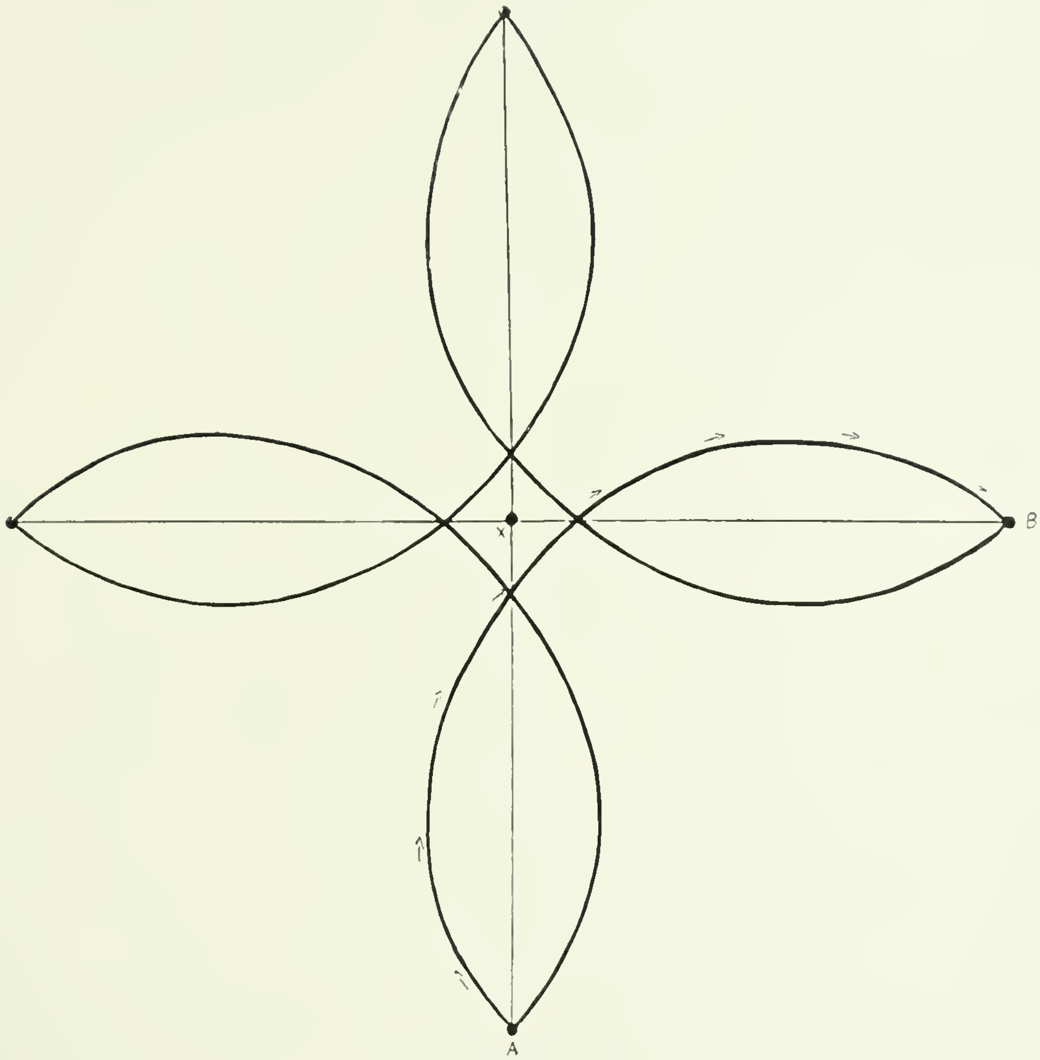
B

C

*Copyright.*] (*Different negative.*)

Optical Registration of Exercise VII.

# PLATE XXV.




Copyright.]

Geometrical Version of Plate XXIV.

itself apparent in all the different systems of physical training; whereas it appears in none, since the days of the Greeks at their zenith.

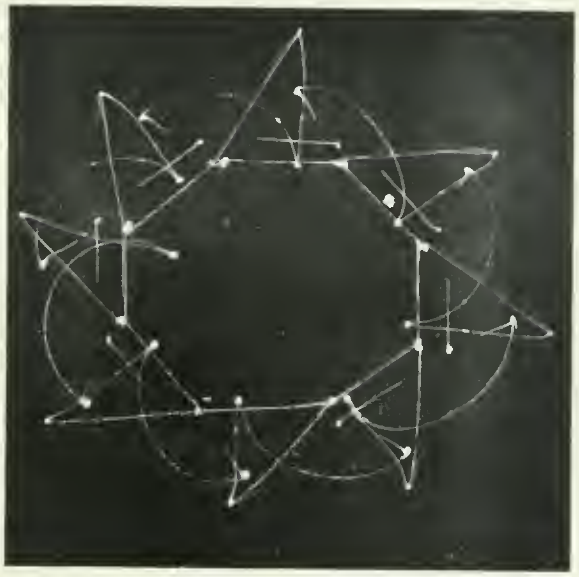
The last of the designs is shown as a geometrical diagram only, and is given on Plate XXVIII. It illustrates Exercise II., but as the most important curve takes place chiefly in the vertical plane, a photograph in the horizontal plane gives no adequate representation of the movement. From $A$ to $X$ is the first step back with the left foot, the right leg following on with the long curve $A$ to $B$. That part of the curve from $A$ to $B$ which appears to be a straight line is not really so, for, from the point of contact on the square about half-way between $A$ and $B$, the curve is continued in the vertical plane in the manner indicated by the dotted line from the right angle to $B$. The pull round of the left arm at the moment of the backward swing of the right leg is indicated by the three-quarter circle $C$ to $D$, which movement brings the body round to a right angle, after which the exercise is repeated. When the exercise has become quite familiar, it will be easy to follow this design in movement. I have given a diagram of this one, in spite of having no photographic original, for the reason that, curiously enough, its occult interpretation has been described as remarkable. Personally I know nothing of the science, but according to Yogi translation it expresses all the symbols of life—the egg, the triangle, the circle, the square, and the star, and in these forms much mystic value seems to exist. I mention this for the simple reason that this is the only design in which all these forms are combined. It will be noticed that in almost all of the geometrical drawings the arcs of actual movement have been rendered circles by the addition of dotted lines. This plan was adopted for the clearer rendering of the design as pattern, the actual movement being sufficiently obvious in the thicker lines. But the dotted lines have only been added where it would have been actually possible to render them in leg movement, so that where they do not exist, only those curves that are shown could be demonstrated physically. From the point of view of pattern, it would, of course, be quite easy to complete them, and thus complicate the design.

So far, the only experiments in photography representing movement in detail have been those of the late Professor Marey, of Professor Charles Richet (his successor, as President of the Institut Marey), and of Professor Pettigrew, who wrote an important work dealing with the discoveries made at the Institut Marey, and adding some of his own in connection with human and animal movement. But nothing more complicated than what Professor Pettigrew called "the figure of eight" was brought to light. This "figure of eight" was formed by the alternating of the feet in walking, both by human beings and animals. The experiments were most interesting, but seem to have been made in connection with unconscious and spontaneous movement only, so that in making a distinction between my own and theirs, I would point out that the designs formed by the exercises already explained represent consciously-reasoned move-

# PLATE XXVI.

A

B



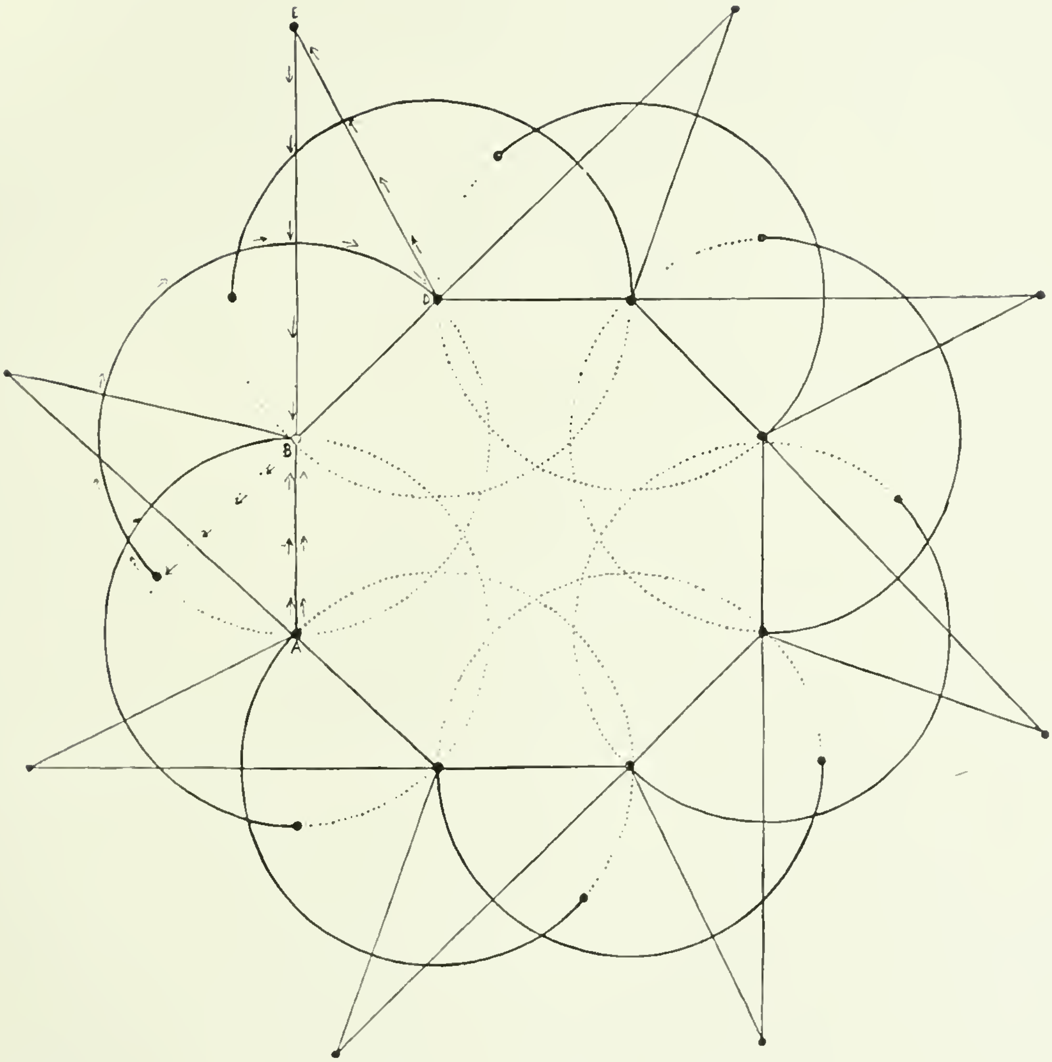
C

D

*Copyright.* *(Different negative.)*

Optical Registration of Exercise V.

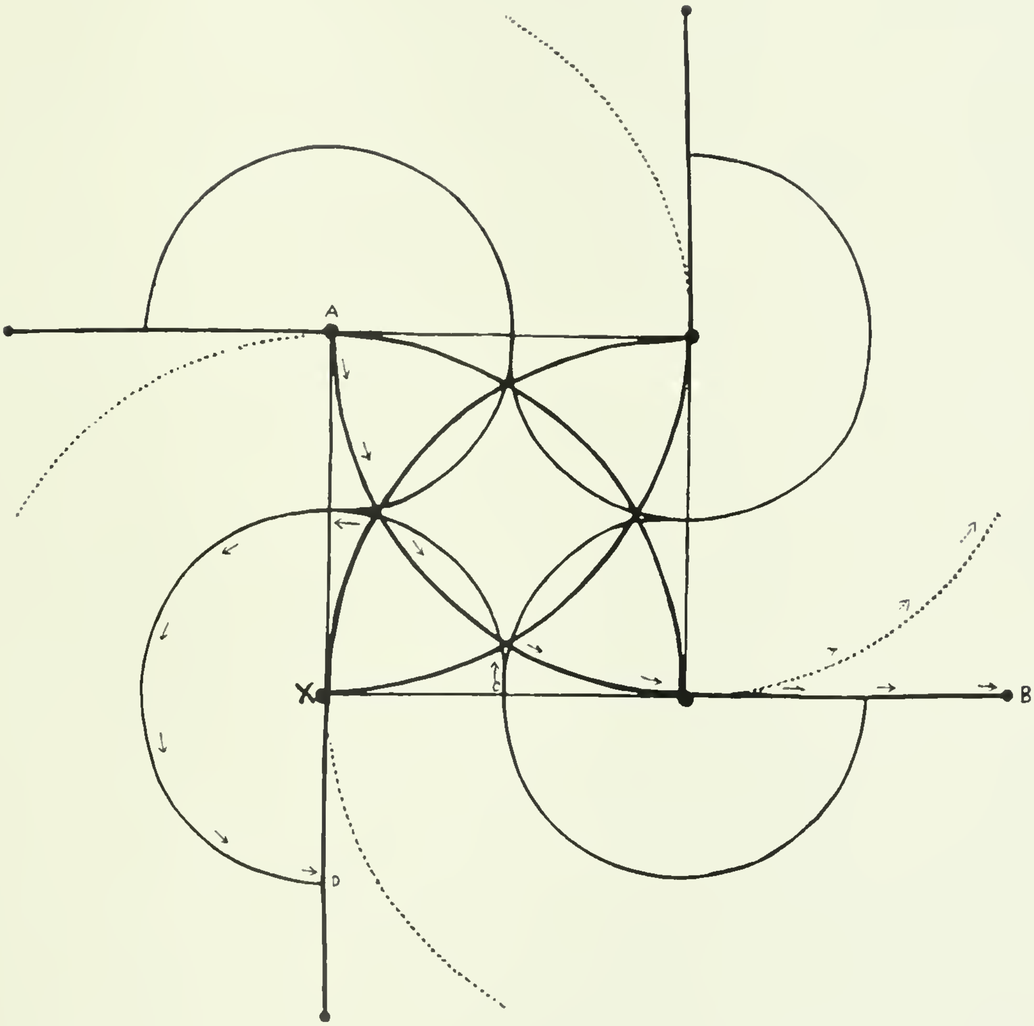
## PLATE XXVII.




*Copyright.*]

Geometrical Version of Exercise V.

# PLATE XXVIII.






Geometrical Version of Exercise II.

ment subject to law, as opposed to unconscious and spontaneous movements of habit. This does not imply that unconscious spontaneous movements may not also be governed by law. As a rule, the more unconscious and spontaneous a movement is, the more graceful it becomes, and the graceful, beautiful thing is the thing that is right and true. But modern conditions make almost impossible the free expression of the law which governs the unconsciously beautiful thing. It is true that Nature reasserts herself the moment she is allowed her liberty, but it is rare that any but primitive races show any of the unconscious beauty of movement, and as soon as these races come in touch with civilisation, the fetters of a misguided progress rob them of all their dignified bearing and elasticity of tread. Under natural conditions, the law of balance is able to assert itself without its being known or understood by the object expressing it. Under modern conditions, it must be studied as the alphabet of all physical training, carefully practised, rigidly adhered to, if any check is to be given to the hideous inroads upon fine development made by heels, hobbles, and similar atrocities. For the modern human being, familiar with all the latest developments of Science, there will be no difficulty in recognising as an axiom that only under the control of fundamental law can freedom find its fullest expression.

Do you remember the description of Camilla, of the Volscians, when she went out at the head of her regiment to fight against Aeneas? "Therewith came Camilla, the

Volscian, leading a train of cavalry, squadrons splendid with brass: a virgin warrior . . . a maiden hard to endure the battle shock and outstrip the winds with racing feet. She might have flown across the topmost blades of corn and left the tender ears unhurt as she ran, or sped her way over mid sea upborne by the swelling flood, nor dipt her swift feet in the water."[1]

Where is the modern Camilla whose feet can show the spring and glory of a free and natural development?

[1] The *Aeneid* of Virgil. J. W. Mackail.

# CHAPTER VI

## THE INTERPRETATION OF SCULPTURE BY THE LAWS OF BALANCE

THE necessity for mathematical accuracy in physical training, on which I place such immense importance, does not imply that all movement based on this principle must be obviously geometrical. On the contrary, the more accurate, the more perfectly balanced, movement becomes, the less visible will be the means by which it is produced. Only the most perfect mathematical accuracy in training can produce the finest "*techne.*" This applies to all the Arts, especially to painting, where the disguised simplicity in the work of Leonardo da Vinci, of Titian, and, in our times, of Sargent, owes its faultless perfection to the infinitesimal details of perspective and form, which are responsible for the balanced harmony of the whole effect, and which were minutely blocked out on the canvases before even the lightest touch of the brush was attempted. Freedom of expression came afterwards, when the thing to be expressed was clear and definite in form and accurate in perspective.

In the case of human movement, the careful adherence to the most accurate form of geometrical exercise for the purpose of actual training allows of a far greater subsequent freedom of expression, when it comes to sports in general, and dancing in particular.

The controlled human being is the free human being. With muscles trained to respond to the finest variations of balance, he can allow himself far greater liberty than one unaccustomed to movements of extreme precision and difficult balance.

This principle of balance in movement is of the greatest importance in the study of antique sculpture, where in many cases so little is left to indicate what the statues were really doing. Although dogmatic assertions respecting them are no doubt dangerous, it is at any rate obvious—in many cases painfully obvious in the light of modern restorations—what they were *not* doing. Take, for example, the Discobolus of the Vatican in the Sala della Biga. If the man who placed the head of the Discobolus looking forward, with the neck muscles twisted and strained, had practised the throwing of the discus, such a mistake would have been impossible. Had he been an athlete, the swing back of the discus arm would have shown him the necessity of freeing the neck muscles to their utmost to prevent strain, and consequent check, on the forward swing of the arm. But it is impossible to reconstruct the movement of a perfect Greek athlete, unless one *feels* the thing he was doing; unless one's own muscles respond to the life and spring that the Greek sculptors were able to chisel into their marble.

How is it possible to realise all they mean unless one can go straightway and do likewise!

The revelation of what Myron's Discobolus meant in movement was, I remember, a great joy; the changes of position from start to finish are so varied; one or two, particularly that of the finish, quite as beautiful as the central poise.

There were evidently several ways of throwing the discus. It might be done standing, in which case the arm began its forward swing from well above the head; whereas in taking the run forward the arm swings very little above the horizontal before descending for the throw.

There is an example of the standing position in the Uffizi Gallery at Florence, supposed to be a copy of one by Myron, but a very poor specimen in every way, and not worth reproducing here.

The Archer of the Aegina Pediment was, as I said in the first chapter, the first statue that I brought back to life; and I shall never forget the joy and excitement of the moment when I became Herakles!—when I found how quickly and silently he dropped into ambush with that wonderful poise on the right toes, and, without another movement, let fly his arrow. With him I sprang up to see whether I had got my man. Yes! There was a neat little round hole in the screen at the far end of my room. There were many more before I had finished; the exhilaration of the two perfectly-balanced movements, the drop and the upward spring, was worth more to me than the screen.

The statue is smiling; a little proud, half-contemptuous smile, for not very far off is Paris, also shooting; very correctly and immaculately turned out, *but with one knee* *on the ground. He* couldn't balance on his toes, and so Herakles sits there with a little confident smile, poised on his toes, as other men use their knees, and quite as firmly.

I think I am right in saying that no one has ever before given an explanation of the *movement* of this marvellous archer figure. His dress and helmet and expression have all been carefully described[1]—but his movement, his poise? Well, he was placed in the narrowing angle of the Pediment, and it was necessary to make him crouching or he would not have fitted in!

After the Archer and the Discobolus, I next turned my attention to the Charioteer of the Capitol in Rome. In this case, both arms, and the whole of the left leg, are missing, but the position of the right leg gives clear indication of what he is doing. Plate XXIX. is the only photograph there is of this statue, although the profile is a much finer view. He is leaping into his chariot; the signal has dropped for the start of the race, and, with arms fully outstretched against the strain of eager horses, he is taking what in Greek would be described as the "leap that is flying."

The movement of this charioteer proved intensely interesting. Professor Loewy describes him as follows:

"C'est un jeune homme dans l'attitude de quelqu'un qui se dispose à monter—peut-être sur un char. Mais dans une telle position aura-t-on l'idée de se forcer à tenir le buste si raide?"[2]

[1] See "Histoire de la Sculpture grecque," p. 265. M. Collignon.

[2] From a letter. See also "Die griechische Plaslik," pp. 109, 110. Loewy.

PLATE XXIX.

*Photo Alinari.*]

The Charioteer of the Capitol, Rome.

The "idea" would only occur to one whose muscles were in perfect condition; to one whose training had taught him the best way to carry a well-balanced body on reliable springs; but that is exactly what the charioteer *did* know, and that is why he looks so calm and confident, as though he were doing nothing at all.

Out in the grounds of the Institut Marey I tried the "leap that is flying," while the cinematograph kept its eye upon me to register what happened to my back. No chariot was there, but we turned a large case upside down, and a good deal higher it must have been than an ordinary chariot, although the charioteer had a high one too, or his right thigh would not have been horizontal. On Cinema Series No. 4 is an enlargement of two of the positions; that marked *A* giving the identical position of the torso and leg of the Charioteer. *B* was such a fine poise that I thought it deserved clearer detail than is possible in the smaller prints. This series forms, I think, one of the most interesting demonstrations of movement one could find, and on careful examination it will be noticed that the spine remains vertical throughout. The fact that there were no reins to hold on to made the balance needed for the leap far more difficult, but the springs of the feet were more than up to their work, as will be seen by the rise on to the toes of one foot when on top of the case.

But it may be asked, Why *did* I rise on to my toes, —surely that was hardly necessary?

That is quite true, but I did it for two reasons: firstly, to illustrate that the whole movement is performed by the foot and knee, more especially the foot; and secondly, as an example of what comes quite naturally into the movement of perfectly trained elastic muscles. I know that, were it possible to drive a Greek chariot, I should always fly into it in the same way, out of sheer joy in the spring. And yet, had that poise been shown in sculpture, it would probably have been criticised as a preposterous "idea."

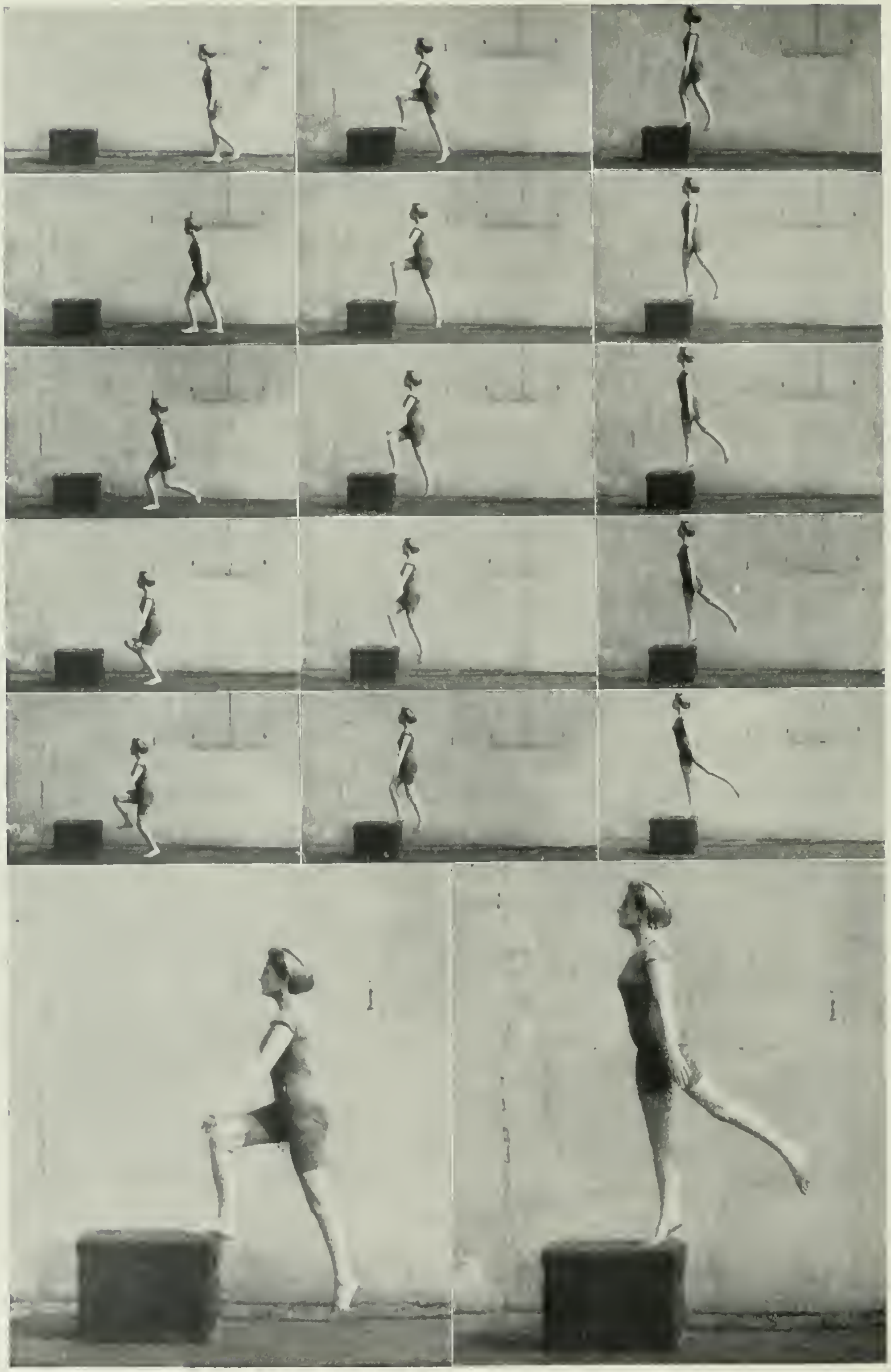
Professor Loewy, who saw me give an actual demonstration of the movement in Rome, was kind enough to say that he thought the reconstruction of the leap of the Charioteer "very beautiful," but thought it could hardly be called "natural," for the simple reason that no one but myself would trouble to keep the back straight when "mounting a chair or any other object of the same height."

I acknowledged that the movement performed under *a condition of perfect balance* was not *habitual*, and would probably be impossible for nearly everyone; but the reason for this lies in the fact that the modern human being has wandered so far from the thing that is finest in Nature, that he is unable to realise that the *habitual* movements are really those which are *un*natural.

And now, what are, to me, the two most interesting positions of the whole series, are shown as enlargements on the second page of Cinema Series No. 4.

They are interesting from the point of view of having been absolutely unconscious, for in the last one of all I

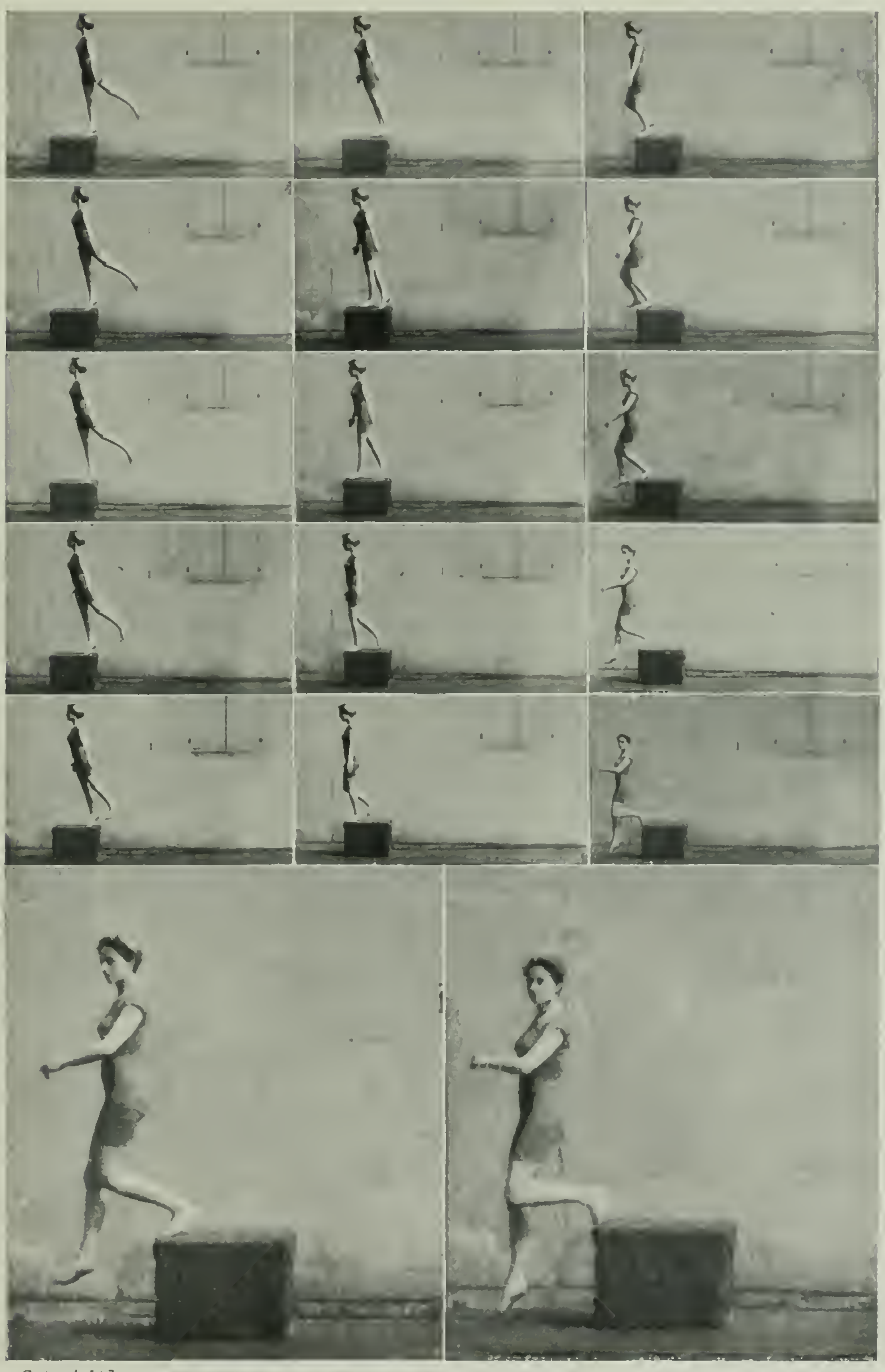
CINEMA SERIES, No. 4.



*Copyright.*]

Movement of the Leap of the Charioteer.

CINEMA SERIES, No. 4 *(continued)*.



*Copyright.*]

Continuation of the Movement of the Leap, showing Descent from the Chariot.

was unaware of being still under the eye of the cinematograph. When I saw the whole series shown on the screen at the Institut Marey, I was pleased to find the relative positions of the spine and the bending springs had been maintained throughout. Then, one day, at the Louvre, while hunting about for odd pieces of sculpture representing movement, I came across the identical position of my descent from the case in a glorious bit of frieze representing the Apotheosis of Herakles, found at Delphi, shown on Plate XXX.

The chariot is there waiting to convey Herakles to Olympus, and Pallas Athena is alighting from it, with the straight back and the extreme bend of knee and foot which indicate the possession of perfect springs. Compare her with figure *D* of Cinema Series No. 4, and the striking resemblance will at once be noticed.

It is interesting to note the curious explanations given for certain positions in sculpture, for the simple reason that it has either not occurred to, or not been possible for, the critic to test the truth of the explanation on his own muscles.

One of the most striking examples of this is in connection with the statue called the "Héros Combattant" at the Louvre.

In a detailed and very fine general description of the statue, Professor Coligonon states that the position of the left foot, which is turned out at right angles to that of the right, is for the purpose of *widening the base.*

If Plate XXXI.[A] is studied carefully, it will be seen that the whole weight of the body is forward over the right foot. The right foot, therefore, constitutes the base, and the left has nothing to do with it and is merely touching the ground with the toes, which have absolutely no weight over them. Why, then, is the foot turned outwards when, if another lunge is made, it in turn will be brought forward and presumably placed upon the ground as straight as the right now stands? For this reason, the pause is a momentary one, in what has been a furious rush forward. There are attacks to be parried on every side, and the shield arm is raised, while the sword arm is ready for the counter thrust. It might be Hector cutting his way through the raging battle around him in the effort to rescue the body of Sarpedon:—

"And in rushed Hector, fierce and grim as any stormy night,
His brass arms round about his breast, reflected terrible light . . .
None but the Gods might check his way, his eyes were furnaces . . .

Every muscle in the body is in the utmost tension, all are bound together as one connected spring, and the position of the left foot is for the sole purpose of preserving tense connection at the *left hip*, so that no extra weight of a disconnected limb should overbalance the body, poised as it is on the right foot. Note the hollow formed by the tense muscle where the thigh bone is turned right back into the socket of the hip.

The secret of the out-turned foot lies there, for it is only by turning out the foot of that tense, vibrating leg that it can be held locked in the hip, part of the spine, one with the whole weight of the body. If, when the leg

PLATE XXX.

*Photo Giraudon.*]

Apotheosis of Herakles.

is tense and locked, the foot is lifted from the ground, it will be found that the movement in no way affects the poise; but if, on the contrary, the toes are turned in towards the front, the balance will collapse at once over the left side, and any attempt to lift the foot clear of the ground will prove impossible.

It is quite easy to test this by taking as nearly as possible the position of the warrior, keeping the weight entirely over the right foot, and holding the left leg as tense as possible. Now, try turning the left toes in towards the front, and follow carefully what happens to the leg at the hip. It immediately becomes unlocked, and as a result the extra weight drags the body down over the left in a way that makes it impossible to keep the balance an instant, especially if the position is tried with the extra weight of a shield on the left arm; though, if the test be made with this additional weight on the left, the sword must be held in the right or the test will not be accurate.

There are so many examples of this position in antique sculpture that it seems strange that the reason for the invariable position of the left foot should not have been given before. One of the finest is that of the bronze figure of the Fighting Theseus, at the Bibliothèque Nationale in Paris, a photograph of which is given on Plate XXXI.[B] In this case, it will be seen that the left foot is barely touching the ground, and the whole poise is beautifully accurate on the right foot. When this left foot is turned in, that is to say, when the toes, bent or otherwise, are in line with the heel, the weight of the body becomes divided between the two feet, and when this happens in a lunging position, the left knee bends under a strain almost impossible to bear, and must soon come to the ground as base for the whole weight; whereas, if the left foot is turned *out*, even with the knee bent to the utmost, the weight of the body can quite easily be kept off the ground. This fact is very finely demonstrated in the beautiful marble statue ascribed to Myron, which is in the Terme Museum in Rome, and is known as the Youth of Subiaco, shown on Plate XXXII.[A] The impression one receives from the position is that of exhaustion, collapse, as though he were making a last desperate defence against an attack from above, in which case he is most probably meant to represent Ganymede defending himself against the eagle. The base is obviously the left knee, which in another moment will be on the ground. An interesting fact to be noticed is, that had the position been intended to represent anything else than collapse, the left foot would have been placed lying over on the inside line with the ankle on the ground, for in this position the knee is locked into its hold and the side muscles then form so strong a spring that the weight of the body can be transferred with equal ease on to either one foot or the other. This alternative position is represented on Plate XXXII.[B], in which it will be seen that the poise gives no impression of exhaustion, but rather that of a spring held in abeyance, and the change has been made by the position of the left foot

PLATE XXXI.

A

Photo Giraudon.]

Héros Combattant du Louvre.

B

Photo Giraudon.]

The Fighting Theseus.

alone. Compare the two lines from the left shoulder to the left foot in the photograph of the statue and that of myself. In my own it is unbroken, and the eye travels unchecked from one to the other. But take that of the statue, and it will be found that the eye is forced to stop at the knee, the whole *drag* is there, and one feels relieved to see the little support under it, in spite of the fact that it is not supposed to be there, being merely a sculptural necessity. The whole of this difference in line and in the impression it produces is due to the angle of the left foot alone; but this one detail means everything to the balance of the body.

The next statue, the position of which interested me very much, was the wounded Amazon of the Vatican, shown on Plate XXXIII. She is very beautiful; but as to whether she is a true Pheidias or not, I would not venture an opinion; or even as to whether she has been given the right head, although this I should think doubtful, judging from the abrupt angle at which it springs from the shoulders. The interest for me lies in the way in which her arms have been restored, for both were lost; but there was sufficient indication to make it obvious that the right arm was raised. It has been restored bent right back in a horizontal line across the top of her head, and although it looks rather aimless to be bending a bow in such a strained position while gazing sadly on the ground with averted face, yet there appears to be no reason why the position should be impossible; that is to say, no reason appears when studying her from the front, and this seems to be the only point of view taken into consideration by her restorer.

By great good fortune, I had the opportunity recently of studying a cast of this statue, with permission to perform upon her any surgical operation I pleased, so I promptly cut off her arms to the line of the original break, and she stood revealed—for there is nothing so baffling as a wrong restoration. Plate XXXIV.[A] shows my version of her position. The work of restoration must, of course, not be criticised, it is purely amateur, but, in spite of this, the position of the arms is as I wished to represent them.[1]

Looking at these two photographs, both taken from the same point of view, one sees nothing to justify my assertion that the position of the right arm in the original restoration makes it quite impossible for her to stand for an instant. It is not till we look at the figure from other angles that such an excessive lean forward is apparent, that nothing but the great weight of the base (extraneous to the figure) could keep the statue from toppling over. This can already be seen from a three-quarter view of the left side of the statue, and Plate XXXIV.[B] shows this position, where, if a vertical line is drawn from the centre of gravity just under the right breast, it will reach the ground about two inches in front of the base of the cast, and about five or six inches in front of the right foot, on which, it can be seen at a glance, she is leaning very heavily. There is absolutely

[1] The photographs of the altered cast were taken by myself and appear for the first time here.

# PLATE XXXII.

A

*Photo Giraudon.*]

The Youth of Subiaco.
Terme, Museum.

B

*Copyright.*]

Alternative Position to that of the Youth of Subiaco,
showing Strong Position of the Left Foot.

PLATE XXXIII.

*Photo Alinari.*]

The Amazon of the Vatican.

no weight on the left foot; she is saving it all she can, for it is obviously wounded, and I picture her leaning on her lance, for she is in pain.

Now look at Plate XXXIV.[c], and try blocking out the restored right arm as well as the lance, and see how uncomfortable it is to look at such an overbalancing weight. I believe the usual contention is that statues were made to be looked at from the front, but no sculptor of repute, much less Pheidias himself, would have committed the crime of placing her in an untenable position, for the reason that it would not be noticed from the front; and surely the profile shown on Plate XXXIV.[c] is sufficient proof that she must have had a support of some kind, for she could not possibly have stood where she was for an instant without one. I believe it is asserted that Pheidias never added accessories; but it would not have been necessary for him actually to add the lance. A people so familiar as the Greeks with the laws of balance, which they practised every day at the Palaestra, would have grasped his meaning from the mere position of the hand, or from the addition of a lance-head alone. The fact that she is not walking, but is in repose, makes her position still more impossible without support.

Two photographs of my own representation of the position are shown in Plates XXXV. and XXXVI., but unfortunately my lance was too short to enable me to give the lift of the right arm accurately, and it will be seen at once that the arm is more bent, and the shoulder lower. But even so, it was impossible for me to hold the position without leaning heavily on my lance, as everyone will find who cares to try the experiment for himself, taking care that the line of the chest at the thorax is six or eight inches in front of the right foot.

The theory that nearly all antique sculpture was meant to be viewed from the front may be carried too far when movements of the body which might be ascribed to quite other causes are explained as having been chosen by the sculptor for the purpose of representing as much as possible of two planes, irrespective of the anatomical possibility of the position. A typical example of what I mean will be found in the Pallas Athena of the Aeginetan Pediment, shown on Plate XXXVII. Her face and shoulders are square to the spectator, while her feet are turning away to the left at considerably more than an acute angle, and she stands with lifted spear and shield. Whoever chiselled this splendid goddess of the strong brow and far-seeing eyes cared little for the showing of her front view simply *as* front view. Look at the feet; once again they indicate, as always, the movement that is to come. Had they been facing the front with the rest of the body, Pallas Athena would have been brooding, dreaming, making fresh plans for the protection of her favourites or the overthrow of their enemies. But her feet are moving already, she is in the midst of her beloved Greeks, inciting, encouraging, leading, and always with the calm and reassuring smile that knows its own power. She is facing round for an instant to give some advice or encouragement; the next moment may see her spear arm

PLATE XXXIV.

A B C

Copyright.]

Altered Restoration of the Amazon of the Vatican.

PLATE XXXV.

*Copyright.*]

Full View Representation of the Amazon.

PLATE XXXVI.

*Copyright.*]

Profile of the Representation of the Amazon.

aloft, her body swung to the other side, with the position of her feet barely changed.

These gods and goddesses of splendid build and perfect aliveness needed no clumsy change of feet to enable them to turn round and see what was happening behind them. Those lithe tense bodies could twist as they pleased. A goddess who could not command three points of the horizon without having to turn her feet was no true goddess; and as a sculptor's conception of a god or goddess was based on the movements of the finest men and women around him, he must often have seen examples of this movement.

Look, too, at the little figure of the Athena in Plate XXX., as she dismounts from the chariot in which Herakles is to be carried to Olympus. She serves to illustrate two points. I have already drawn attention to her beautiful little straight back; now, look at the way she is turning completely round from the waist, her right hand still holding the reins perfectly taut until she is actually on the ground; all the lower part of her body is stepping out from the back of the chariot, while her head and shoulders are still facing the horses.

There are numerous other examples of this position in vase-paintings, all of them vibrating with the full and perfected activity that made these movements natural as well as habitual; and therefore it is impossible to conceive either painters or sculptors as men unable to get beyond the representation of two planes. Look at them now in the new light of a far different activity from that which is expressed by the movement of a modern human being, and the two-plane theory disappears.

Three photographs are shown on Plates XXXVIII., XXXIX. and XL., in which the body has taken three different positions without any movement of the feet except a slight pivoting. All three positions will be found on vase-paintings. Personally, I find it quite easy to throw a lance to all four points of the compass without moving the feet at all. I should begin in the position represented on Plate XXXIX., but with the head and shoulders turned away, facing the direction of the right arm. This would command my eastern side, supposing I am facing north. Then, of course, would follow the turn of the whole body for the command of the northern section. For that of the western I should merely turn the waist to the left, bringing my shoulders into a parallel line with my feet; while for the last position I should turn it farther still into an obtuse angle by lifting the left foot on to the extreme point of the big toe, though without altering the direction of the foot in the least. This lifting of the foot gives greater length to the muscles of the left side, and enables the waist to turn easily into the obtuse angle, and thus command the whole of the southern section. During all these movements of the shoulders, the feet will have remained pointing to the north. For perfectly-trained, elastic muscles, this is quite easy, and I only cite it here as the more likely reason for the representation of a very favourite position in antique sculpture.

PLATE XXXVII.

*Photo Giraudon.*]

The Athena of the Aeginetan Pediment.

PLATE XXXVIII.

Copyright.]

Representation of a Vase Painting of the Athena.

PLATE XXXIX.

Copyright.]

A complete Volte Face without lifting the Feet.

PLATE XL.

*Copyright.*]

Another Change of Position with Feet still unchanged.

The last statue I have chosen to represent here is that of the little goddess Fortuna, shown on Plate XLI., an exquisite little bronze statue in the Naples Museum. Some archaeologists say she was meant to be flying and that parts of the wings are left, also that the globe does not belong to the statue, being of a much later period. This is all possible, and yet, who, looking at her as she stands serenely poised, can deny that the man who restored her thus was inspired? Silent and immovable she stands, on a bronze globe garlanded with spring flowers, to represent the Earth. Drawn up on to the extreme point of her toes, she looks as though hovering over the world, light as thistledown, and yet, in her tense, vibrating immobility, she is the very essence of Force, an expression of the controlled Will Power which dominates, while yet able to rise above things earthly. Plate XLII. is my reproduction of this statue as an example of pure poise. I have shown it in profile so that the position of the feet may be more clearly seen, and also to prove that the balance is maintained solely by the tremendous grip of the toes, the ball of the foot being raised some distance above them. This photograph forms also a good illustration of the possibility, under a special condition of Tension, of standing on a smooth sphere without any artificial aid, drawn up on to the first phalanx of the toes, and maintaining the position for nearly two minutes.

The remaining photographs in this chapter illustrate different positions in my interpretation of a Greek dance. They were all taken in actual movement, and are interesting from the point of view of balance, for the reason that the vertical line from the centre of gravity to its base remains in every case unbroken. The base is invariably the ball of either the right or left foot.

Plate XLIII. is an almost identical reproduction of the position of the Aphrodite in the painting found at the Villa Item, in which she is teaching the infant Dionysus to dance on his little toes. Plate XLIV. is a good example of the lightness of touch upon the ground resulting from extreme Tension. Plate XLV. is a very good instantaneous photograph of the movement which constitutes the recurring *motif* of the dance, viz., that of the Greek Dancing Boy, one of the finest of the vase-paintings, and shown in diagram. It was a great puzzle to know how he arrived at such a position as the result of a harmonious and rhythmical change, because the mere lifting back of one foot at intervals would have been anything but a beautiful movement. Eventually, I found what he was doing, and reconstructed the beautiful curves which led up to his poise. I also found that it was impossible to arrive at it except on the ball of the toes. Plates XLVI. and XLVII. show two more positions in the dance.

With these last photographs I close the first part of the book, for with this chapter ends all that is demonstrable by photograph or design.

Three aspects of a training in balance under Tension have been studied: that in relation to physical development, that connected with mathematics, and finally that which applies to sculpture. There are still two more phases to

PLATE XLI.

*Photo Alinari.*]

The Goddess Fortuna (Naples Museum).

PLATE XLII.

Copyright.]

Poise of the Fortuna in Profile.

PLATE XLIII.

Copyright.]

Position of the Aphrodite at the Villa Item.

PLATE XLIV.

Copyright.]

PLATE XLV.

Copyright.]

Position of the Greek Dancing Boy.

PLATE XLVI.

PLATE XLVII.

Copyright.]

be examined, but what follows can be shown by no photographs, proved by no designs.

So far, I have dealt with actions, definite and visible. Henceforth reactions take their place, just as definite, just as visible, but on a different plane, and in the end of far more intrinsic value.

# CHAPTER VII

## MENTAL REACTIONS

*"The laws of moral nature answer to those of matter as face to face in a glass . . .*

*"The axioms of physics translate the laws of ethics. Thus: Reaction is equal to action."*

EMERSON.

IN the formulation of a new theory, child of one's own brain, one is confronted with many difficulties, not the least among them being that of making intelligible the language with which it has spoken at birth; a language quite clear to its parent, rendered so by the absence of any necessity for actual utterance, and above all for the reason that one has lived with it from its birth and become familiar with its every expression.

The theory enunciated in the following chapters is the result of five years' work, during which every step was proved, not only in my own experience, but in that of many others. It is offered because it is a conviction—drawn from ideas, practice, experience and realisation.

The reflex action of physical movement upon the brain is not yet generally recognised, although the admitted relation between muscle and mind has been proved by the latest method of training a mentally deficient child through motor culture to intellectual. But I have gone farther, by proving that the principle may be applied in more elaborate form to the normal child, also to the adult, with the certainty of being able to produce a higher stage of mental development.

The individual powers are increased to their maximum, and great change in degree may become change in kind.

The link between the two organisations is Tension, which, while connecting the chain of physical processes with that of the mental, is allied to both. This merging of the organisations is only possible when the degree of sensitiveness to which the nervous and muscular tissues have been brought has reached the culminating point of development. The physical activities are then hardly distinguishable from those usually regarded as purely mental, and this fusion of the two forces doubles the intensity of both: that of the physical, by contributing a perfected system of transmission for the will without obstacle or resistance; that of the mental, by reason of its liberated power of expression, which makes possible a stronger and more varied current of ideas, and removes farther and farther the limitation of physical disability.

Let us now examine more closely the definite reactions set up in the machinery of the brain by this process of keying up the muscular and nervous tissues of the body through Tension. This process of keying up produces a very highly developed degree of sense activity, which may best be described as the full consciousness of every muscle, a condition which allows of the instant transmission of messages from the brain.

The road along which we are now travelling needs very careful clearing, otherwise the use of certain expressions may prove misleading. I will first therefore define my meaning of the phrase "full consciousness of every muscle."

This involves no actual anatomical knowledge; scientific knowledge of this sort in no way furthers a perfect physical training. On the contrary, I should regard it as a drawback, in the same way that a very detailed physiological knowledge, *under certain conditions*, is conducive to exaggerated care, or even nervous apprehension. Therefore, the full consciousness of every muscle in no way necessitates a knowledge of their names, nor even scientific understanding of their functions. The consciousness of which I speak is the result of an increased sense activity, which forms the soundest basis for all experimental reasoning, the only reasoning on which one may theorise with certainty. Hypothesis and synthesis then become merely different stages in one experiment on a complete organisation, and not, as is usually the case, the result of a theory evolved by one person and tested on another, from which the conclusions drawn do not result in absolute certainty.

The fullest consciousness, as also the truest knowledge, come through increased sensitiveness, both physical and mental, and are independent of all scientific education, while forming an indispensable attribute to it.

In reply to the question that may be raised as to whether this full consciousness is likely to destroy spontaneity, it must be remembered that there is a significant difference between consciousness and self-consciousness. The more consciously one controls action of any kind, the more one concentrates upon the thing one is doing and the less upon the self that is doing it.

Self-consciousness implies a wandering notice of how others may regard one's action, while full consciousness involves a power of concentration on the action performed, to the entire elimination of self as the performer, and therefore becomes true spontaneity, which means purely internal suggestion independent of all stimulus from without, with complete indifference to and independence of external interference or constraint.

Let us return then to the most important function of this full consciousness, the power of instant transmission of messages from the brain.

To be able to operate in this way, the brain must be in perfect working order, constantly alert, for in a series of rapidly changing movements, messages have to be sent without hesitation and in their right order, otherwise a block occurs.

Roughly speaking, the activities of the brain may be classified into three departments. The first receives impressions; the second forms ideas from those impressions; the third expresses those ideas in action.

We will suppose that the first department receives an impression; it then passes it on to the creative department to be registered as a definite idea, after which it passes to the third department to be expressed in action—or not, as the case may be.

In any case, the impression has passed through each department and left the road clear for the next. This process is quite simple while impressions are being received slowly; the difficulty arises when the impressions follow each other very rapidly, for unless all three departments are in perfect working order, the result is a clogging of the second or registering department, which is unable to check off the impressions as they are received, so they lie piled up, as it were, in a blur of unconsciousness, which may or may not result in action, but which could never result in consciously controlled action.

The expression "blur of unconsciousness" is perhaps better defined as a substratum of impressions which have never been consciously registered, and which form a sort of sediment of thought liable to rise and obscure the clearer ideas.

It is here that I venture to establish a connection between my own theory of altered mental activity, and one put forward by the late William James in his lecture on "Human Immortality." He suggests that the brain is not a producer, but a transmitter, of thought:

"According to the state in which the brain finds itself, the barrier of obstructiveness may be supposed to rise and fall. It sinks so low when the brain is in full activity that a comparative flood of spiritual energy pours over. At other times, only such occasional waves of thought as heavy sleep permits get by. The brain, under these circumstances, would be the independent variable, but the mind would vary dependently on it."

In connection with this idea I am able to state as fact that it is possible to reduce to a minimum this "barrier of obstructiveness" by the practice of perfectly balanced sequential movement. It takes a long while to accomplish, but it *can* be done.

One begins with a brain which may be compared to a clumsy instrument, which only allows at first the passing of incomplete ideas.

With practice, the clumsy instrument makes for itself something finer and more complex; that is to say, it brings into use the more sensitive portions of its mechanism, until finally it arrives at the power to make a sort of mental fine adjustment wheel which is able to register hair's breadth differences and flashes, which before were impossible to the less perfect instrument.

It is the possession of this mental fine adjustment wheel which gives the perception of things through their essence, through the knowledge of their proximate cause, instead of by their result, and enables the judgment to subordinate the importance of action to that of motive and incentive.

The immediate transmission of messages from the brain, together with their instant transformation into action, constitutes the very highest realisation of Will Power, and on Will Power depends the amount of control possible to a human being.

The chain of mental processes may thus be formed in the following way:

Consciousness pure and simple may be defined as the awareness of force, and the fuller or more awakened this consciousness becomes, the greater will be the power of its activity, force itself being consciousness rendered active.

The maximum activity can only be reached through Tension, therefore the particular degree of awakened consciousness which may be acquired depends on the amount of Tension applied to the muscular tissues.

The amount of Tension is governed by the degree to which control may be exercised, and control depends entirely upon Will Power.

Therefore, as Will Power is the medium of expression of conscious force, it forms the last link in this deductive chain, and comes in touch with the first, which was passive consciousness.

The most important result, then, of these mental processes is the acquisition of an enormously strengthened Will Power, the secret of concentration.

In the performance of the sequential exercises, the first call that is made upon the brain is for concentration—a concentration, moreover, of a very peculiar type, and entirely contrary to the usual fixed attention required in the study of problematical subjects or in the effort to commit long passages to memory. In these latter cases the brain works upon itself, so to speak, a process resulting in a degree of fatigue which finally makes concentration impossible.

The sort of concentration needed in sequential movement requires that the effort made should be, not upon the brain itself, but upon the dynamic expression of its ideas, and as this dynamic expression demands extremely rapid execution, it stands to reason that the brain movement, or thought registration, must unfailingly precede the physical movement.

This results in the development of an elastic and widely comprehensive form of concentration, one that is able to pass rapidly from one point to another, while yet retaining a clear and definite idea of the sequence as a whole.

While the ordinary type of fixed concentration is unable to perform movements of rapid mental registration, that of elastic concentration includes the power of fixing on any particular point or subject with much greater clearness of perception than would otherwise be possible.

In his "Text-Book of Psychology" William James says:

"The faculty of voluntarily bringing back a wandering attention over and over again is the very root of judgment, character, and will; no one is *compos sui* if he have it not. An education which should improve this faculty would be the education *par excellence*. But it is easier to define this ideal than to give practical directions for bringing it about."

Another and greater philosopher—Socrates—once said to his pupils:

"Self-control is an exact science, and when discovered the whole world may become virtuous."

The basis of this science lies in a perfect physical development: *on that alone* depends the mighty structure of an awakened consciousness, and, as "the laws of moral nature answer to those of matter as face to face in a glass," the evolution of a perfected mental organisation is, I am convinced, governed by the same laws as that of physical development. A completely altered condition of mental activity is made possible by rendering the machinery of the brain in perfect working order through the reacting influence of the practice of sequential movement under Tension, complicated by extremely difficult conditions of balance.

In the physical world, the fatigue caused by the vacillating movements of an unbalanced body corresponds to that caused in the brain by the friction of indecision.

A sure knowledge of the individual power of each muscle with an absolute reliance on their being able to respond instantly to any call that is made upon them, finds its mental reaction in what Browning called "the eventual element of calm," that indispensable basis of judgment, a condition of mental equipoise which makes possible the control of all thought-movement.

Here it may be advisable to define what I mean by control, for it does not necessarily mean restraint or checking or holding back, but may equally represent stimulative as well as repressive power.

"Self-mastery" is the more complete rendering of the idea; the ability to let oneself go, being sure of one's hold on the reins; not the license of unrestraint, but the Power of Freedom. Epictetus said: "He only is free who can control himself."

Before dealing with further reactions, there are two points I wish to take up in detail, although both of them are merely side issues, and have no immediate connection with the main theory.

The first is in connection with the substratum of impressions which are formed by the clogging of the registering department of the brain when unable to keep pace with the work required of it.

I venture to offer the conjecture that this substratum of unregistered impressions constitutes the subconscious self, and that is a condition arising from habitual neglect of the training necessary for the perfect working of the mental machinery—a neglect not of the individual only, but of the race, and which may become quite as much an hereditary weakness as any of the more definite physical diseases. Although I speak of a condition in which subconsciousness predominates as one of weakness, it does not necessarily imply that all action directed by the subconscious self must invariably be bad. That will depend upon hereditary tendencies and traditional influences; but habitually controlled action can only be the result of a continuous motor existence, the outcome of a brain that is always alert, where every moment of the waking hours is fully conscious, where every thought and movement has its justification and nothing comes at random.

In each human being will be found unplumbed depths, to a greater or lesser degree, according to the type of his antecedents, depths which it rests with each one to attempt at any rate to fathom.

The transmission of hereditary weakness becomes the key to the solution of another problem, viz., the transmission of consciously determined qualities. Heredity becomes a science in which the Will Power of the mother on the unborn child becomes the chief factor. When this science is knowingly neglected, the responsibility for the sins of the children rests largely upon the heads of the parents, more especially upon that of the mother, who, if she understand aright the determinate quality of trained Will Power, will be able to form the character of the child before ever the light dawns upon its earthly awakening.

No more important branch exists in the study of Eugenics than this, which deals with the definite training of the unborn mentality by the will of the mother.

"Man is a god in ruins," says Emerson, "he is the dwarf of himself. At present man applies to Nature but half his force. . . . In the end, we shall come to look at the world with new eyes . . . by yielding ourselves passive to the Educated Will."

The second point which needs further elucidation is in connection with the enormously increased power of active will made possible by Tension.

Will Power may be divided into two kinds, that which expresses itself in a force which is the result of instinctive desire or fear, and that which represents the force which is trained and controlled by reason.

The first permeates the whole of Nature, animate and inanimate, and acts without conscious control. The second is that possessed by the human being alone, who is able to direct it by self-recognised reasoning power.

I have been asked whether this Will Power or active force which becomes generated and enormously strengthened under a condition of highly developed Tension is the same as that of a panther just about to spring at its prey; as that which gives to a hunted stag the power to leap a chasm it would never have attempted without a pursuer at its heels; whether it is this which enables a weak woman to perform prodigies of strength to save her child from danger, or that has taken most of us over big fences out hunting that we should never have attempted in cold blood. "Cold blood!" that zero point of our Will Power which is thought sufficient for everyday use.

In all these instances, the resultant force is the same, and the condition of Tension must have existed as an inseparable medium of expression for that force. But the incentive causes are different. In the case of the wild animals, instinct guided their movements, hunger and fear the two strongest, while in the case of most human beings, some special emergency has been needed to awaken it, either danger or unusual excitement. After these spasmodic efforts the result is collapse or overstrain to a greater or lesser degree, according to the stimulating agent. This use of Will Power as the result of accident or special excitement may be classed with all instinctive or uncontrolled expression.

The Will Power that is possible to acquire through a systematic training in Tension, is of a nature that forms the *basis* of all action, however simple; an alert control which becomes the rule instead of the exception, so that whatever call is made upon it, the answer comes at once, and *without effort*, leaving no penalty of overstrain, a condition in which catastrophe or mere incident receive an equally ready response.

The power to place oneself at will in a condition of Tension in which force may be expressed at its maximum constitutes practically another sense. It is extremely difficult to define in words what this sense means to the one who is able to acquire it. Completely altered vibration, producing a feeling of continuity of movement; a conscious physical connection with some essential force of the Universe, together with the ability to make use of it—such a description may raise a smile of incredulity, but this is the result when the highest degree of Tension has been attained; at this culminating point, a human being becomes able to comprehend and assimilate Cosmic Force as an almost tangible thing.

This highly developed sense of movement thus becomes a perfected sense of touch to the degree of being able to feel the movement of vibrations to which less sensitively developed organisations are dead.

Aristotle ranked the sense of touch as the first and most important. "First the natural, then the spiritual. The sense of touch, of feeling, is the basis on which the other and higher senses rest."

The link which brings the trained human being into conscious connection with things Infinite is altered vibration. It is possible for a human being to become keyed up, as it were, to a pitch of sensitive receptivity, which makes possible this assimilation by the physical organisation of some force, from which it must be separated so long as it cannot respond to that particular standard of vibration.

The analogy is obviously that of the instruments used for wireless telegraphy, which have to be keyed up to a certain pitch of sensitiveness before being able to receive and respond to the Hertzian wave.

Increased rapidity of vibration through Tension is productive of two apparently contradictory results. The first, as I have pointed out, is that of a highly sensitive receptive condition. The second is a maximum resistant power to other forces.

The analogy for this second condition is a spinning gyroscope, which generates a force strong enough to resist to an extraordinary degree any effort towards deviation of direction.

It is even possible for a human being in the highest state of Tension to lose *all consciousness of bodily weight*, having, as it were, come in touch with some other force, and become *part of it*, to the extent of being able to make use of its power.

My own theory on the subject is that, while the body is in this condition of tense, alert, muscular control, it becomes a conductor of the unknown force of which I spoke, and that the actual weight of atmospheric pressure, together with the pull of gravitation, which give to a body in slack condition the feeling of downward drag, are no longer *felt*, being enabled to pass through tense matter, leaving it with barely the sense of touch upon the ground; while the same body, left limp and slack, would become non-conducting, and, so to speak, earth the force, in the same way that damp wood "earths" or "grounds" an electric current. It would then make felt every pound of its pressure, and as weight, according to dynamic law, is reckoned as force, the pull downwards of gravitation which we regard as weight may be nullified by the stretch and upward lift of Tension, which thus becomes a counteracting force.

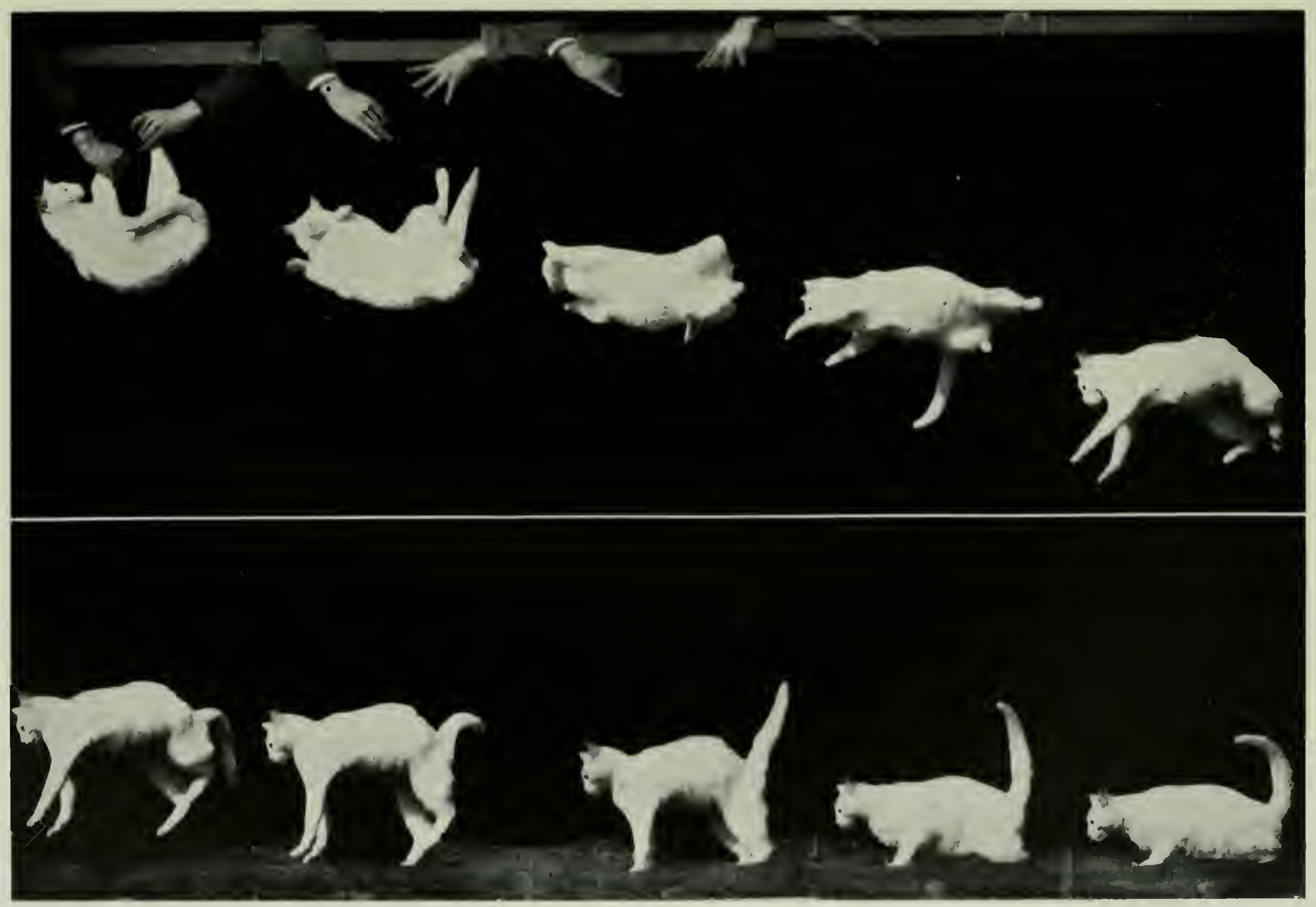
This resistant power of Tension is well illustrated in the case of a cat falling, and Plate XLVIII. is an extraordinary example of the instinctive Tension in animals.[1] The middle photograph in the bottom row shows the moment of actual contact, when the cat's legs appear stretched to three times their normal length, while its tail is reared up in a vertical line above its back like a steel rod.

It is practically impossible for the average spectator to register this position, and one has the impression that the cat comes to the ground in the condition of slack elastic, as shown in the last photograph.

A little while ago I said that the power to place oneself at will in a condition of Tension constitutes practically another sense. Looking first at the simplest result of Tension as a trained condition, it will be found

[1] This selection from a series of cinematographic photographs illustrating the rapidity of the cat's turn in the air has been kindly lent to me by the Institut Marey.

PLATE XLVIII.



Example of Tension in a Falling Cat.

that movement as ordinarily understood is as different from the *sense* of movement as strokes from finished writing.

In its highest form of development it becomes a thing almost supernatural.

A sense which has never been developed or which has been atrophied or destroyed becomes practically non-existent. Sound means nothing to the man deaf from birth, but Sound is there, although *invisible* to him, while to the blind man sensitiveness to sound is developed to such an abnormal degree that he is able to sense movement in a way that appears nothing short of miraculous to the ordinarily endowed human being. A blind man may even discern differences of colour through their varying vibrations. When this sensitiveness to vibratory movement is developed to such an abnormal degree, it resembles that possessed by the bat, which enables it to avoid during rapid flight any object with which it might come in contact, and which may be defined as a sense of approach through vibration.

Science has been able to apply the principle of the bat's little organ to an instrument which is now being fitted to ocean liners. This instrument is able to register the distance of an approaching object, either vessel or iceberg, in time to avoid collision.

All these analogies go to prove that what is possible to perfected mechanics is also possible to a perfected mental organisation, but to a much greater degree.

So long as one keeps unsevered the connecting link between the mind and its physical means of expression, one may advance without fear into the region of psychological experiment in the effort to attune one's nature to the highest sensitiveness attainable. But this result *must* be achieved by keeping in touch with a controlled physical consciousness, that one's visions into a world of transcendentalism may have their hold on the solid ground of reason and fact.

In this way it is possible, through increased sense activity, to realise life at its maximum, to gain an insight into the almost limitless possibilities of a perfectly trained Will Power, and to visualise the result of a brain mechanism so perfect structurally, that it neither distorts nor obstructs the stream of consciousness which flows through each human mind from the "Mother Sea."

# CHAPTER VIII

## SPIRITUAL REACTIONS

*"The principal contrast under which effort is viewed by Aristotle is that of mere existence on the one hand, and a complete activity on the other, of empty unsatisfied life, which ever looks vaguely beyond, and of life which realises its end and finds satisfaction in itself, of the being given by Nature and that well-being which is achieved by one's own acts. . . . Aristotle, in fact, is profoundly convinced that complete activity, with its transformation of the whole being into living reality, yields at the same time the full sense of happiness.*

*"Hence happiness is principally our own creation, it cannot be communicated from without nor put on like an ornament; rather it is proportional to rational activity, and increases with it.*

*"Hence only when activity attains complete substantial efficiency, does it lift human existence up to happiness."* [1]

SO they knew—those Greeks of old—the intimate connection between a perfect physical development and its moral sense of well-being, and it would seem probable for this reason, that a training which could so influence the moral side of human nature becomes in the end a religion in itself, seeing that in a condition of perfectly balanced physical strength and well-being the mind and soul respond more fully.

The word "hieros," "sacred," originally meant "strong," "fresh," "vigorous." Dr. Schroeder considers that it was eventually restricted to religion, from the

[1] "The Problem of Life." Rudolf Eucken.

"uplifted feeling of the worshipper—the sense of strength which his religion brought him."[1]

Surely a reversal, this, of the order of cause and effect! More probably the discovery that complete happiness could only be reached through complete physical activity, induced them to connect with religion the thing they most valued, and led them to adopt the word "sacred" in connection with the worship of their deities, for only with the best would they approach the altars of their gods.

That the Greeks knew the intimate connection between the diaphragm and the mind can hardly be doubted, for their word "phrēn" means spirit or mind, and the "phrēn" (or, as it was generally used in the plural—phrēnes) actually denoted the diaphragm, "the muscle that separates the heart and lungs from the lower organs."

"Within the phrēnes, the Greeks placed not only all such feelings as we now connect with the *heart*—love, hatred, grief, anger; but also the faculties now attached to the *brain*—intelligence, thinking-power, memory, will."[2]

They divided man into three parts: (1) "Soma," the body or covering; (2) "Psyche," the soul; and (3) "Phrēnes," the seat of mental and spiritual life, this last being by far the most important of the three, and considered the "noblest part of the man."

Haemon tells his father, Kreon, that the "gods have

[1] "Makers of Hellas," p. 224.
[2] *Ibid.*, p. 293.

implanted in men (human beings generally) the phrēnes (feeling, mind, will, thinking faculty) *of all possessions the highest* . . . the power, namely, of forming a moral judgment, of distinguishing right from wrong, justice from injustice."

The conception of spirit was totally apart from any idea of religion as expressed in worship. To the Greeks, it meant the *fine fleur* of moral courage and energy, and was the glory of their Paganism, as indeed it may be the glory of every creed, being independent of though common to all. The striking examples of religious fervour, whether Catholic or Protestant, Pagan or Puritan, which stand out in the world's history, have been due to this same spirit which inspired the leaders of religious movements. It was not the particular creed that made the man, but the spirit of the man which was able to glorify his creed.

The training, then, of that particular muscle which was "of all possessions the highest," formed the secret of the marvellous unity of their development. Each step they took in advance was a complete one, for they regarded each side of their nature as inseparablc from the other.

"Whereas some thinkers—St. Paul, Pascal, Byron—have seen in man a two-fold nature . . . God and beast . . . the Greek was not conscious of such a distinction; he only saw a unity, 'glorious in its action and itself,' in which humanity was not distinct from divinity, nor body from soul."[1]

[1] "The Greek Genius and its Meaning to Us." Livingstone.

The definite reaction of the diaphragm upon the spirit is proved in moments of joy when one takes deep, expanding breaths which lift one up; while in depression one's head falls forward, one's "heart sinks," as the saying is, and there is a general feeling of collapse.

Now the converse of this is also true; that is to say, by the practice of tense uplifting movements, you may induce its corresponding state of mind. It is this which explains how the basic principles of aesthetic law are indissolubly connected with dynamic instinct, for in finely-balanced, tense movement lies the solution of the problem of this law, and a clear answer is given to the reason "why" of our perception of beauty in whatever form it may be expressed, either through music or painting or sculpture.

This answer is the power of *lift*, physical and mental, and, rightly understood, the exhortation of the Psalmist in the words, "Lift up your hearts," comes to have a literal far more than a figurative meaning.

On the strength of the diaphragm depends the strength of the spirit, that unquenchable flame of conscious Will Power, the energising fire that Aristotle called "the reality, *energeia*," in contradistinction to the temporality of mere brain mechanism.

There are many allusions in the *Iliad* to this energising Will Power, with which Homer endowed the Greeks and Trojans alike—a Will Power that was able to restore on the instant exhausted faculties, physical and mental.

This, I am convinced, was achieved through definite movement of the diaphragm, a bracing into tension which results in an immediate mental and spiritual reaction. That is to say, this is the result when the whole organisation is already in a perfectly trained condition.

I believe it is considered by some translators that Chapman allowed himself too much licence in the translation of many passages of the *Iliad*, but filled as he was with the Greek spirit, his interpretation of these passages seems to render in more vivid form the energising fire with which the Greeks were so deeply imbued.

In the Fifth Book, Atrides reviews his troops, and encourages them with the words:

"O friends," said he, "*hold up your minds;* strength is but strength of will."

Why did he say that? Had the Greeks been in the habit of locating the mind in the head, he would not have spoken thus to his men. But he knew, as they did, that all that meant spiritual and mental strength was in the diaphragm, and he was simply telling them to brace their bodies into tension that the will might have unhindered command of their whole natures.

In the Twelfth Book occurs this passage:

> "The Trojans fought not of themselves, a fire from heaven was thrown
> That ran amongst them, through the wall, mere added to their own.
> The Greeks held not their own; weak Grief went with her wither'd hand,
> And dip't it deeply in their spirits, *since they could not command their forces to abide the field.*"

Meaning here that had their physical control been stronger, the will would have been able to operate effectively, enabling them to hold their ground and to keep the fire of their spirit undimmed.

Again, in the Eighteenth Book, the Trojans reach a point when retreat for a time becomes the wiser course, and Polydamus urges them not to put too great a strain on the mental strength, although he recognises that it is capable of carrying them on even when all the physical force is exhausted.

> . . . . "If ye yield, though wearied with a fight
> So late and long, we shall have strength in council and the night.
> And (where we here have no more force than need will force us to,
> And *which must rise out of our nerves*) high ports, tow'rs, walls will do
> What wants in us."

And so on, all through the *Iliad*, runs the spirit of a force born of the will alone, which could be relied upon to the very last.

Chapman himself realised that he would be criticised for his interpretation of many passages, and he answers his "Commentors" in his "Commentarius" at the end of the Seventeenth Book by a vindication of the rendering of a certain passage in these words:

'It is something probable that their oversight [meaning the Commentors], in this trifle is accompanied with a thousand other errors in matter of our divine Homer's depth and gravity, which will not open itself to the curious austerity of belabouring art, but only to the natural and most ingenuous soul of our thrice sacred poesy."

In the examination of all new theory, the search-light of austere and sincere criticism is the only means by which complete analysis of construction may be determined.

To "the natural and most ingenuous soul" will be revealed the inspiring flame which escapes analysis, eludes even definition, but which illumines, with a clear radiance, the understanding in which one spark exists as touchstone.

The knowledge must be there. It only remains to *know that we know;* and herein lies the secret of all discovery of truth. The discovery consists in telling others what they know already, while yet unaware of that knowledge.

Truth, in whatever form it may be expressed, is so simple that when revealed, all normal human beings recognise it instantly, and the telling of it consists in arranging the mosaic of facts in a pattern which appears most clear to the one who has been puzzling over its different colours with a view to evolving a clear and definite design.

To all my assertions will come the question of the sceptic: "How do you know? What proof can you offer?"

To this the only answer is that given by the mathematician Euler when questioned as to the correctness of his famous law of arches: "This will be found contrary to all experience, *yet it is true.*"

A thing is only impossible when it implies a contradiction, but a law which has been found contrary to all experience need not necessarily involve this contradiction.

The theory which I offer is in accordance with Nature's highest laws of development, and in no way against them.

It may be argued, that complete control over one's nature is impossible under existing human limitations, but I recognise no limitations. All life is movement, and the finest life must take its impress from the finest movement, the finest spirit from the finest activity.

There are no real statics in the realm of expression; each entity has a story, and life is its telling. The symbol on paper is not the whole of language.

The knowledge that there are no limits to the heights is the incentive for the soul. The work of striving becomes the joy of accomplishment, and the goal is beyond the stars.

If the future were known, existence would lose its charm, so may we revel in the Infinite, realising that there is nothing perfect save law, and that to reach perfection would be to lose it.

To realise the energising fire of an awakened consciousness is an approximation of the ideal.

An awakened consciousness is a mighty thing! Through this, life appears on a much bigger scale; it is the science of living, the verb "to live," made into something real and vital through the completeness of every expression of life.

And the glory of it all lies in the fact that the power to achieve this ideal is latent in each human being. Each may find for himself the master-key which will open wide the doors of a new world, if willing to pay the price; it depends only on this.

In this new world may a man find his soul, and enter into his full heritage.

Before the harp can yield the glory of its music, its strings have to be stretched and keyed up to the *power of response*.

The power to respond is the highest desire of the human being Without it, man is lost; with this power developed to its utmost limits, the road is clear, and nothing can obstruct or discourage.

To the human being whose organism has been trained to recognise and respond to the highest laws comes reward in the shape of a power to discern and accept the inevitable without wasting strength and energy in useless combat, at the same time realising how few—how very few—conditions *are* inevitable with a will strong enough to overcome and dominate circumstance rather than be moulded by it.

This is the culminating point of achievement in moral reaction, and is the direct outcome of that conservation of energy, both physical and mental, which gives to life in its whole expression the clear-cut movement and definition of action, the unity of perfectly balanced forces working together with the minimum of strain, and thus achieving the maximum result.

And this result, once achieved, is there forever; there is no slipping back, no growing stiffness of knee joints to be remedied, no slackening muscles to be worked up, no aching spine that demands longer hours of couch repose each month or year, no nervous strain or irritability or uncertainty, only calm confidence in the power to envisage, unshaken, every eventuality.

Everything works in harmony, and the physical disintegration, inevitable under the law, becomes almost imperceptible from its unity of change.

Under normal conditions, it would become possible eventually so to conserve the energies until the end, that no one particular part of the physical organisation would have greater demands made upon it than another, the habit of a perfectly-balanced life resulting in the gradual —very gradual—lowering of the flame; and as flame expires while yet rising, so will that energising fire, the flame of man's spirit, remain clear and strong to the last, lifted and inspired by the knowledge that it is possible for human nature to achieve its highest end on earth.

Having reached this condition, the concept of time becomes one, not of duration but of *degree of attainment*, independent of all circumstance, and the answer to the eternal question of the pessimist, "*à quoi bon?*" rings out clear and true.

A clear vision; the realisation, if only for one day, of all the possibilities of life at its maximum activity, these are ample reward for all its pain, for all the wounds that come to those who fight, and the attainment of this ideal must be a preparation for all eventualities.

If the flame dies for ever, then the top note of achievement has been reached here. If it is to wake again into a life fuller and more perfect than yet dreamed of on this plane, then no effort has been lost, and the fresh start will be made from a higher standpoint than would otherwise have been attained.

But on whatever plane the spirit of man finally arrives, the words that Keats placed in the mouth of the Greek god of old will for ever remain true in their representation of the ideal achievement in life:

> "To bear all naked truths,
> And to envisage circumstance, all calm,
> That is the top of sovereignty."

# DETAILED EXPLANATION
# OF THE
# TWELVE BASIC EXERCISES

## INTRODUCTORY NOTE

THE clear explanation in writing of a variety of complicated movements is extremely difficult. I have, therefore, supplemented the instructions with as many photographs as possible, the most important positions being shown in full-page plates, while intermediate changes of position are shown by pages of cinematographic detail, which render the analysis of every changing movement an easy task. Each exercise, with two or three exceptions, has its own series of large photographs, together with the cinematographic explanation of balance, thus forming a complete study in itself. It is recommended that the first two exercises should be taken as a commencing lesson, and that, as the movements become more familiar, gradually other exercises may be added, one at a time. Eventually, when the whole series has been learned, each practice should be confined to four or five different exercises, a different set being chosen for the following practice. The only approach to definite routine that I strongly recommend is that of beginning all practice with *Exercise I.*, however much the others may be varied. This first exercise has proved itself the most useful for the initial suppling of the muscles, after the body has been drawn up into the Preliminary Position.

## INTRODUCTORY NOTE

Half-an-hour's practice will be found enough for the first few lessons, but later on, when muscles and joints begin to get more accustomed to the movements, an hour will seem very short. This, however, should be the limit for any practice, however perfect the student may become. Each exercise must be done the same number of times on each side, the instructions being reversed from right to left, and great care taken to omit no detail of this reversal.

## EXERCISE I

FROM the Preliminary Position, raise the arms in front until the elbows (very slightly bent) are on a level with the breast-line, the hands tightly clenched and about a foot apart. Now take a step back with the right foot, carrying the body with it at exactly the same moment, and taking care to keep the torso—viz., that part of the body from shoulder to hip—absolutely vertical, by bracing the muscles of the waist to their utmost tension. The moment the right foot touches the ground, let the knee bend as much as will lower the body about four or five inches. During this backward step the left leg remains perfectly still and tense, straight as a rod of steel, with only the extreme point of the toe touching the ground, the heel well raised, the upper line of the instep curved outwards. In this position the whole of the weight is on the right foot, so that the left might be raised up and down without disturbing the vertical line of the body.

Plate XLIX.[A] shows the position as seen from the front; Plate XLIX.[C] gives it more clearly in profile, and an imaginary vertical line should pass through the ear, shoulder, hip, and ball of the foot, while the knee has left it without in any way disturbing the rest of the line.[1] From this position, swing the left leg up and across the line of the right, straight and tense, until it reaches the horizontal, at which point it should form an acute angle with the right leg, that is to say, it passes in front of the right leg to the extent of an acute angle. During this movement, the right knee remains bent, but the right foot is pushed forward on to the ball of the toes, which allows the torso to remain vertical and the left leg to swing freely. It will be found that if an attempt is made to swing up the left leg while the right heel is on the ground, not only will the leg not be able to reach the horizontal, but the knee (that is to say, the left knee) will bend, and the shoulders will come forward, destroying any attempt at poise. This apparently easy movement of raising the right foot on to the toes while the knee is still bent, is one of the most difficult, and it is only after long practice that it can be done without moving the body itself. This upward swing of the left leg is accompanied by the simultaneous downward swing of both arms well to the left, to balance the movement of the leg to the right. The arms should, at the finish of their swing, form an obtuse angle to their first position, and thus make a complete diagonal line with the left leg across the direction in which the body faces. Care should be taken in swinging them down not to alter their relative position, but to keep them always about a foot apart, the

[1] In the case of Plate XLIX.[C] the position was photographed before the full bend of the knee was accomplished, which when completed would have brought the ear, shoulder, and hip slightly more forward until all were vertical over the toes.

# PLATE XLIX.

A B C

 1 2 1A

Exercise I.

## CINEMA SERIES, No. 5.




Exercise I. in Detail.

elbows slightly bent, as at start, although the arm that passes in front of the body will necessarily have a more decided bend than the other.

Plate XLIX.[B] shows very clearly this poise, in which the position of the right foot should be carefully noted, as this is the movement so difficult to perform. The angles formed by the left leg and the arms in relation to the direction of the body can be very easily seen from this photograph. There should be no pause when the left leg reaches the horizontal line, but, like a pendulum, it swings down again instantly, while simultaneously with this downward movement must come the upward return of the arms to their first position, and the straightening up of the right knee to allow both feet to come together for the final poise well up on the toes, which is the same, of course, as that shown in Plate XII.[D] During the lowering and raising of the body, with its counteracting movements to right and left, the torso should remain tense and vertical, particular care being taken not to twist the waist while swinging down the arms, but to carry them only just so far as will balance the movement of the left leg. Intermediate positions are clearly shown in Cinema Series No. 5.

From the final poise on the toes, the exercise should be recommenced, and only on the initial step backwards of each repetition should the right heel touch the ground, after which all other movements must be performed poised on the ball of the foot.

These instructions constitute a counsel of perfection, and it must not be expected that this nicety of balance can be acquired in a week or a month. Many things go to make up such a condition of equilibrium, which can only be acquired gradually, as the mind becomes better able to control the physical movement.

For practice on the left side, these movements should be reversed. The exercise should be repeated five or six times on each side, going back in a straight line and the poise on the toes being carefully maintained for several seconds after each repetition, though this again will be impossible for a beginner, who will be forced to place the heels on the ground at first to avoid falling over altogether.

## EXERCISE II

FROM the Preliminary Position, raise the right hand to the shoulder, with clenched fist, twisted as far as possible to the left, the elbow bent and kept as closely to the waist as will allow the forearm to remain vertical. Simultaneously with this movement, the left forearm is brought across the waist in a horizontal line, the hand also clenched.

As the arms are being brought into position, take a short step back with the left foot, carrying the body with it, so that the whole weight is over the left, while the right foot remains barely touching the ground with the extreme point of the toe, the heel well raised and the upper line of the instep curved outward. Plate L.[A] gives this position. During the whole of this exercise, the knees remain absolutely straight and tense. Care should be taken to avoid the least movement of the waist while stepping back, for, unless perfectly tense, it has a tendency to twist and relax, altering the level of the two hips, which at once destroys the balance. The two definite movements which prevent this alteration in the hips are the conscious drawing up of the waist muscles, and the raising of the right heel to lengthen the line of the right leg, so as to allow the body to go back far enough to form a vertical line over the left foot.[1] From this position, the

[1] To test the difference in length made by raising the heel, place it on the ground again, and note the pull forward.

body must be spun round on the ball of the left foot in a right angle turn to the left, the right leg swinging back and up at the same moment. This is a much more complicated movement than at first appears, for, as soon as the backward swing brings the leg to a lock against the right hip, the movement is carried on by bending forward on the left hip, while the right leg and spine form one continuous line, which should work in unbroken connection, the leg rising while the spine is being lowered, until the two form a horizontal line, when, if possible, the poise should be maintained on the ball of the left foot for a few seconds. The spin round into this position is aided by a rapid pull round of the left arm, made by drawing the fist in a semi-circle from its first position at the waist to a point on a level with the left shoulder, the elbow bent to its utmost limit, so that both arms are now in the same position, the right arm having remained unaltered. The hands should be pulled well back in a conscious effort to expand the chest; the head thrown back so that even when the full bend of the body has been reached, in a horizontal line, the face and head remain vertical as though standing. This is a most important detail, as any alteration in the position of the head at once upsets the poise, which is one of the most difficult to maintain. Plate L.[B] illustrates this poise, which is extremely interesting from the point of view of the different angles formed by the varying weights of torso and leg, and the precision needed in their combined movement to enable the centre of gravity to remain over its base.

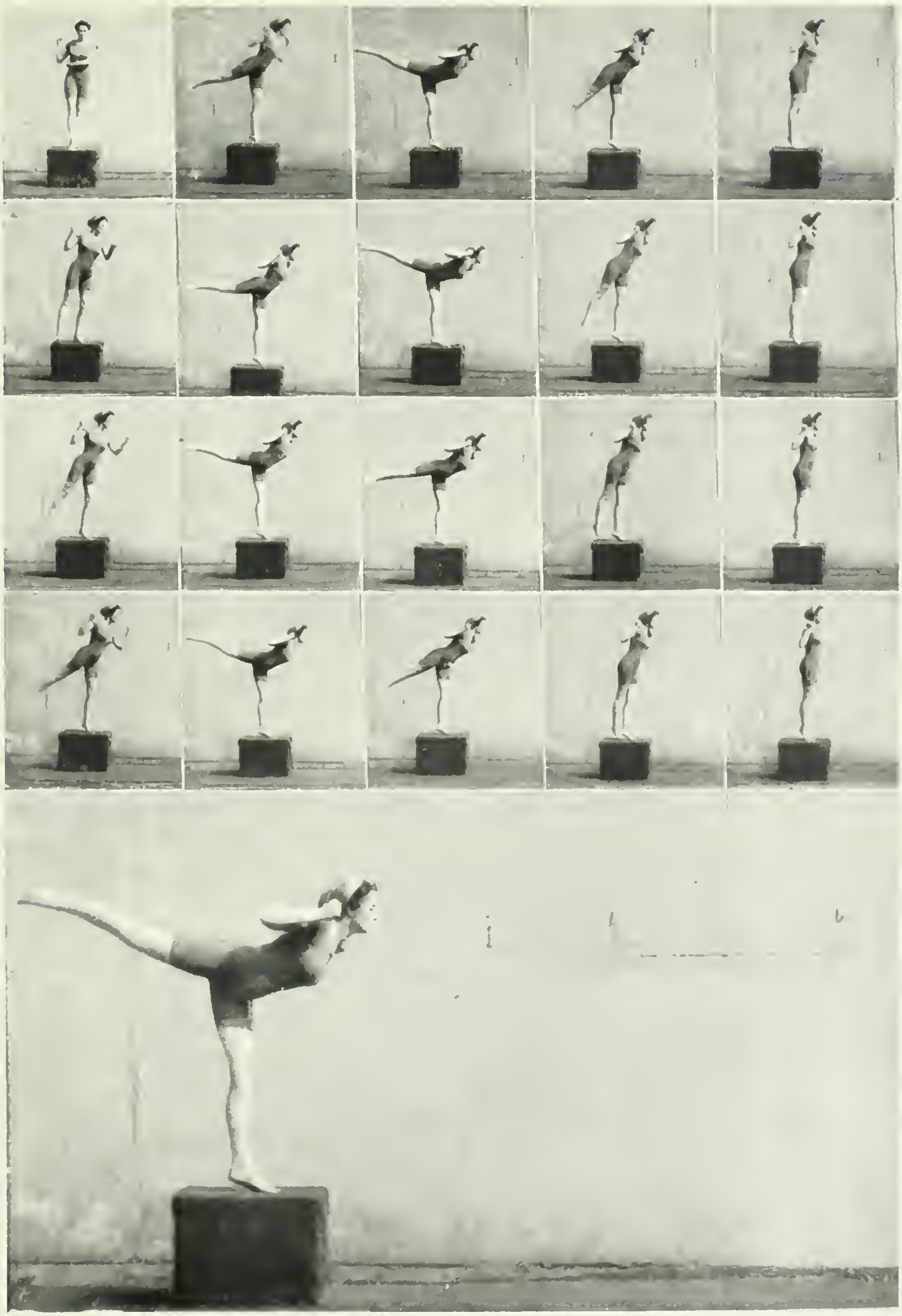
# PLATE L.

A B C

*Copyright.*] 1 2 3

Exercise II.

CINEMA SERIES, No. 6.

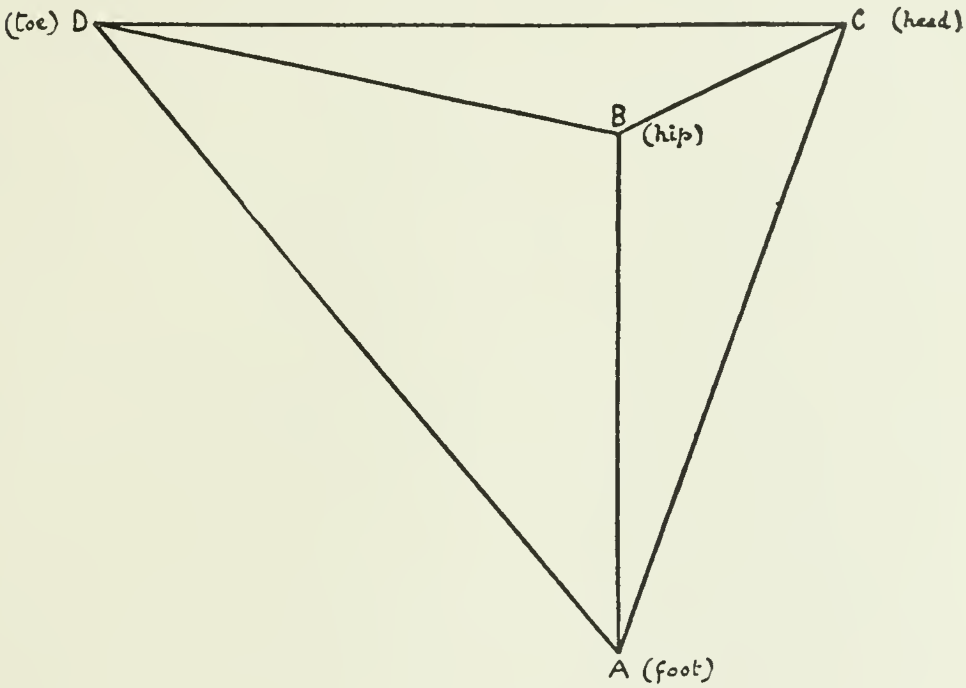


*Copyright.*]

Exercise II. in Detail.

## EXERCISE II

If an imaginary horizontal line is drawn on the photograph, the forehead and toe will be found to be the extreme points, while the vertical line, starting upwards from a little behind the ball of the left foot, will pass through the knee and the left hip. The angles formed by the two lines, first from the head to the left foot, where it




touches the ground, and again from the right foot to the left, together with the connecting horizontal of the line from the right toe to the head, constitute an example of the triangle of forces resulting from the difference in weight of the torso and leg. I have given a diagram illustrating, with exact measurements taken from Plate L.[B], the triangles formed by this poise. By lowering the horizontal line until *C* and *D* are level with *B*, that is to say, by straightening out the extended leg and torso, the angles *D B A* and *C B A* become right-angle triangles of different size. It will be seen at once that there must be considerably more weight in the angle *C B A* to enable it to poise on the same base as the larger angle *D B A*. This is why it is so important not to add to the length of the body-line by lowering the head, as it then becomes impossible for the leg to counterbalance the extra weight, having already reached its utmost length, and like a see-saw badly balanced, one end goes up while the other comes to the ground. This is certainly the most fascinating poise to attempt, albeit the most difficult to achieve; and it may be wondered why it should have been selected as the second exercise. The reason is that, although the movement itself is one of the most difficult, the exercise may be classified among those which do not involve such complicated mental direction as most of the others. As this mental control constitutes the greatest difficulty in connection with these exercises, they have been arranged with a view to facilitate a gradual increase in the power of concentration needed, that special concentration of which I spoke in Chapter VII., which enables the mind to pass rapidly from one point to another with unhesitating certainty, and always just ahead of the physical movement.

The recovery from this poise is made by a reversal of the movement of the horizontal line, the start being given by the tense muscles of the waist, which are able to raise the body and lower the right leg simultaneously without in any way disturbing the rigidity of the line. The whole body, therefore, returns to its vertical position the moment the right foot comes to the ground, and the final poise should be maintained well up on the toes with the feet pressed close together. Plate L.[c] shows the final position of recovery, and Cinema Series No. 6, giving the details of this exercise, is one of the best of all the Series, the apex poise, viz., No. 9 (the first poise of the third row reading from left to right), being so fine that it was worth an enlargement for the better definition of detail. I am afraid a little spirit of bravado induced me to show this poise on a pedestal! For, already an extremely difficult balance on solid ground, it is quite an achievement on a raised and none too certain base.

It will be some time before the pupil will be able to achieve this recovery from the horizontal poise. Time after time the exercise will be cut in half by the uncontrollable pitch forward of the body. But patience, and a right leg as tense as a steel rod to the tip of the toes, will eventually be rewarded with a momentary poise which brings a quite unusual exhilaration of its own, and is the best possible incentive to renewed effort.

Later still, when an occasional recovery has been achieved, the repetition of the exercise should be begun where the first finished, viz., at a right angle to the starting-point.

Four of these repetitions will therefore bring the feet to the exact spot at which the start was made, thus completing a geometrical series. It should, however, be some time before these completed series are attempted, as the details of one exercise must be thoroughly mastered before complicating the mental movement by further combinations.

## EXERCISE III

STARTING from the Preliminary Position, take a lunge forward with the left foot, carrying the whole weight of the body forward at the same moment as the advancing foot, bending the knee as the foot touches the ground, sufficiently to force up the heel about an inch, leaving the weight poised on the ball of the foot. The right leg should remain tense and unbending during the whole of the exercise on this side, and as the body is carried forward on the lunge, it leaves the right foot relieved of all weight, so that only the extreme tip of the big toe touches the ground, while the foot itself should be turned well outwards and form a right angle with the line of the left foot. Simultaneously with the lunge, raise the left arm in a parrying movement, so that the forearm passes in front of the forehead about four inches distant, horizontal from the elbow, and tense to the tip of the outstretched fingers; the palm of the hand facing outwards. Plate LI.[A] shows this position, and an imaginary line should pass through the left ear, shoulder, hip, and ball of foot, while the knee will be well in front of this line. The photograph of this position is a little off the profile, which gives the impression that the line would end in front of the foot instead of at the ball, but this is not really the case. The exact height of the left heel from the ground is controlled by the bend of the knee, and when it becomes impossible to get nearer than one inch to the ground with the heel, the knee bend will have reached its limit.

From this lunge the second position is reached by straightening the left knee, and thus raising the body four or five inches; which movement necessitates the lowering of the left heel to the ground for an instant, although no weight should be placed on it. Simultaneously with the straightening of the left leg, the right rises from the ground still stretched out behind at the same angle, and finally raised four or five inches from the ground. There must be no pause, however, on this second position, and the moment the left leg is quite straight, the right leg should be swung round in a wide semicircle in which the hip constitutes the rotary axis. This movement carries the body round with it in a right-angle turn to the left, which must be made on the ball of the left foot. The curve is stopped as soon as the right-angle is reached, by bringing the extreme point of the right toe to the ground, a little in front, and to the left of the left foot, so that the knees are crossed, the under part of the right knee touching the knee-cap of the left. The two feet should be turned in opposite directions, the left, on which the turn has been made, pointing slightly to the right, and the right turned across to the left, each in acute angle to the direction in which the body faces. Plate LI.[B] shows

# PLATE LI.

D C B A

Copyright.] 4 3 2 1

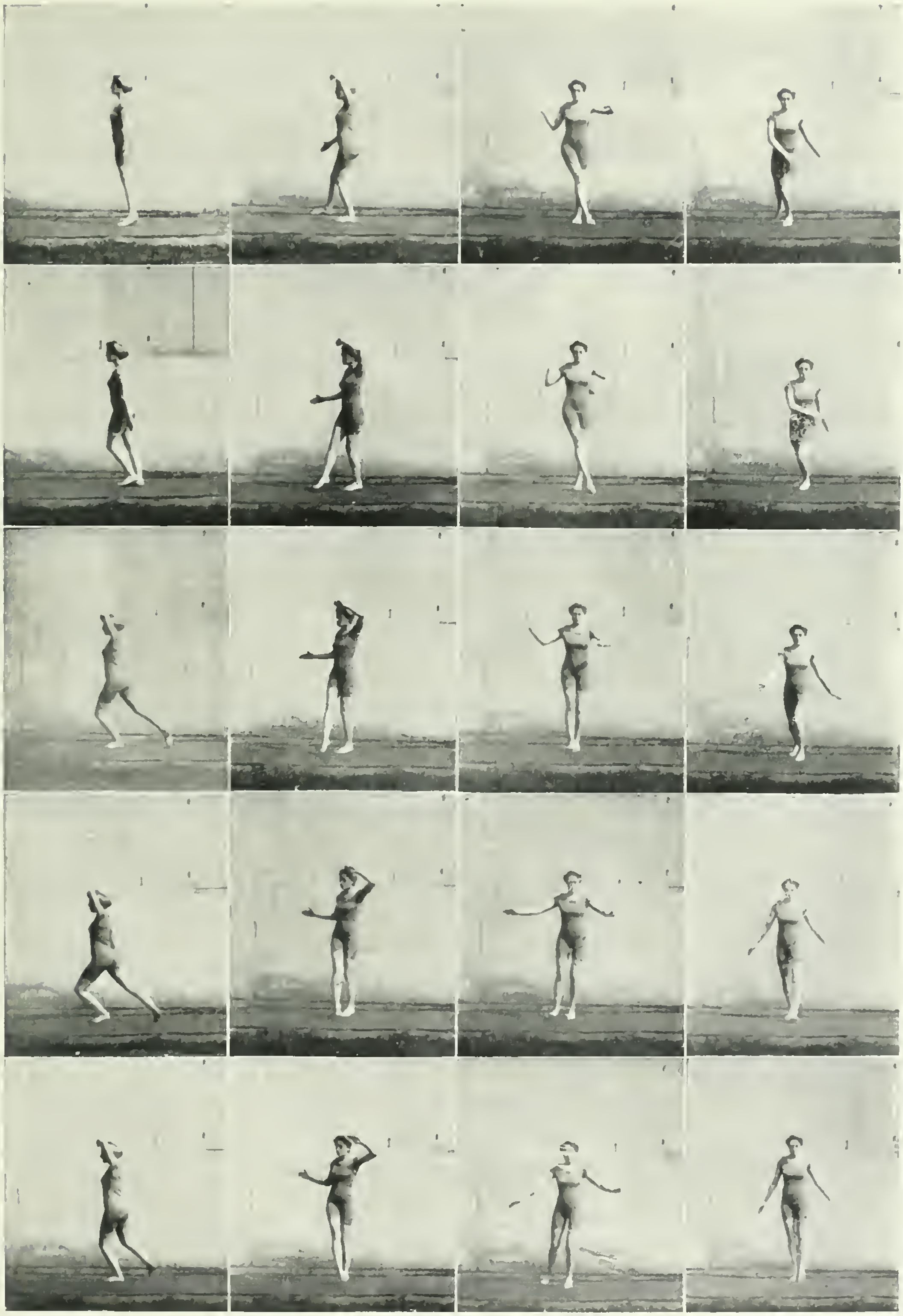
Exercise III.

this position so accurately that it will be at once understood. Again, the test of the vertical line will prove the balance correct, and will be found to pass from the nose, down through the centre of the body, directly to the ball of the left foot. This extremely difficult movement is only possible by keeping the body in a tense vertical line over the left foot the whole time. The left leg represents the pivot arm of a compass, while the right leg swings round tense as to muscle, but quite loose at the hip-joint, in the same way as the moving arm of a compass. Great care must be taken to put no force into the movement, which would at once disturb the vertical pivoting line and upset the balance. It will be found that the weight of the right leg is sufficient to carry on the momentum when once started on the curve. Above all, it must be remembered that this right leg must be like a rod of steel with Tension, so that no disconnection occurs when it meets with resistance at the hip-joint. This happens when half-way through the curve, and it is this resistance which is needed to bring the vertical line of the body and left leg into the movement, into which they will be swept without the least break or check, *provided the Tension is unbroken* and the weight poised well up on the ball of the left foot, which, as pivot, must cover the least possible surface. The great difficulty will be to keep from bending at the waist, and care must be taken not to invite this by leaning forward with the head to see what the feet are doing; for what the neck does the waist copies unconsciously. Any lean forward of the head means collapse of the poise, which should be so exact that the right leg may, by way of test, be lifted well up from the ground without disturbing the vertical line of the body, poised as it should be full on the left toes, to which the instep should be almost perpendicular.

I have purposely left the arm movement to the last, so as to avoid undue complication, but it must be remembered that it is performed simultaneously with the leg curve. As soon as this begins, the left arm should be brought down from the position of parry in a semi-circular movement, to a point level with the left side of the waist, and about two inches distant, the fist clenched, the elbow well bent, pointing outwards and slightly backwards from the side. The right arm must be brought up by bending the elbow, until the hand, with open palm turned outwards, is on a level with the right shoulder, and distant about five or six inches. This finishes every detail of Plate LI.[B] It should be possible to remain erect and still in this position, poised on the left toes, with no weight on the right foot, which, as I said before, may be lifted a few inches from the ground merely as a test of the perfect balance on the left. From this position the right leg is swung backwards in a wide semicircle, tense and unbending as always, while yet loose and free at the hip-joint. This movement is accompanied by the simultaneous bend of the left knee, so that the body is again lowered four or five inches, and is once more in the lunge position, the right foot almost in line with the left, and turned out as before at right angles to the left. The hands should be swung down to the left simultaneously with the leg movement, the elbows slightly bent, the fingers outstretched and tense. In Plate LI.[C] all the details of this position are clearly shown. Care should be taken that the arm-swing does not alter the position of the hips although the waist itself makes a slight turn to the left. The final recovery, which is made by springing backwards and upwards, from the left toes, finally bringing them close to the right, is shown on Plate LI.[D] This spring back is performed entirely by the ball of the left foot, carried on by that of the right, which receives the weight, these movements being aided by the Tension in the right leg, which three factors combined draw the body up once more into a vertical line, both knees straight, the right arm having swung round in a semicircle to the right side during the spring, the whole weight finally poised as high up on the toes as possible, the feet pressed close together. This finish leaves the body at a right angle to the start; and, as in the case of the other exercises, the next one should be commenced from the finishing angle, so that the series of four may be completed by a return to the starting-point. But, again, this should only be attempted when the single exercise has become familiar, as the effort to complete a series invariably destroys the perfection of detail until it has become definitely mastered. This is due to the alteration of angle, which is unexpectedly disconcerting at first. It is wiser, therefore, to practise for some time the two different sides only, recommencing at the same starting point. Eventually, two series of four exercises on the right and the same on the left are, as a rule, enough of this particular exercise.

Cinema Series No. 7 will render clear whatever has been difficult to explain in this exercise. Several faults are apparent: notably in the fifth of the first row, where it will be seen that the right knee is bending as the leg begins to swing round. There was some excuse for this in the torture of spinning round with bare feet on a piece of linoleum which had become scorchingly hot in the blaze of a July sun; a rather severe test on one's powers of concentration. There is, however, a very fine climax of poise in the second of the third row, and, if looked at with a magnifying glass, the extreme tension of the leg muscles and especially those of the foot will be clearly seen.

CINEMA SERIES, No. 7.



*Copyright.*]

Exercise III. in Detail.

## EXERCISE IV

STARTING from the Preliminary Position, take a very short step backwards with the right foot, carrying the body well back so that all the weight is over the right *heel*, leaving the left foot with only the extreme tip of the toe touching the ground, the heel well raised, and the upper line of the instep curved outwards. (See Plate LII.[A]) The arms remain throughout this exercise the same as in the Preliminary Position, viz., drawn down to their full length at the sides, and tense to the finger-tips. The body also and poise of the head should remain absolutely unchanged, the whole movement being confined to the left leg, which is to perform a wide three-quarter circle on the principle of the moving arm of a compass; the pivot arm being represented by the immovable line of the body and right leg, revolving on the heel, and actuated by the motor incentive of the left leg alone, without any independent movement. Having taken the step back, brace both knees to their utmost Tension, remembering that the whole body must remain in a tense vertical line over the right heel, which will form the pivot. The start for the pivoting movement is given by the left leg, which should swing straight from the hip in a wide, gradually-rising, backward semicircle, straight and tense, with the toe still pointing towards the ground. Plate LII.[B] shows the starting movement of the left leg, and is a very good photograph of this position. There should be no sense of effort in effecting this turn. None whatever is needed; the turn of the body being effected by the resistance of the leg against the hip at a certain point, which resistance is amply sufficient to bring the body itself into the sweep of the curve, provided always (and this is the whole difficulty) that it is able to maintain the unbroken vertical line through Tension, so that a pull at any point of this vertical line will act on the whole line *at its pivot only*, viz., the heel. The resistance at the hip occurs when the left leg has reached a right angle to its start, and at this moment the left toes should be slightly raised so that the heel may revolve quite freely. The pivot foot makes a revolution of a half-circle; the body the same, so that when the curve ceases the student should be facing exactly the opposite direction to the start. To arrive at this, the left leg must make three-quarters of a circle, at which point the left foot comes to the ground, on the ball of the toes, while the left knee bends instantly to allow the weight of the body to be transferred to the left side in a vertical line over the ball of the left foot, resulting in a side-lunge as the final position. At the same moment that the left foot touches the ground the right will have finished the pivoting movement on the heel, and without a pause this heel should be raised so as to leave only the extreme point of the toe touching the ground; the right leg remaining throughout like a rod of steel,

# PLATE LII.

A B C

Copyright.] 1 2 3

Exercise IV.

straight and tense; the body, arms, and head in exactly the same relative position as at the start.

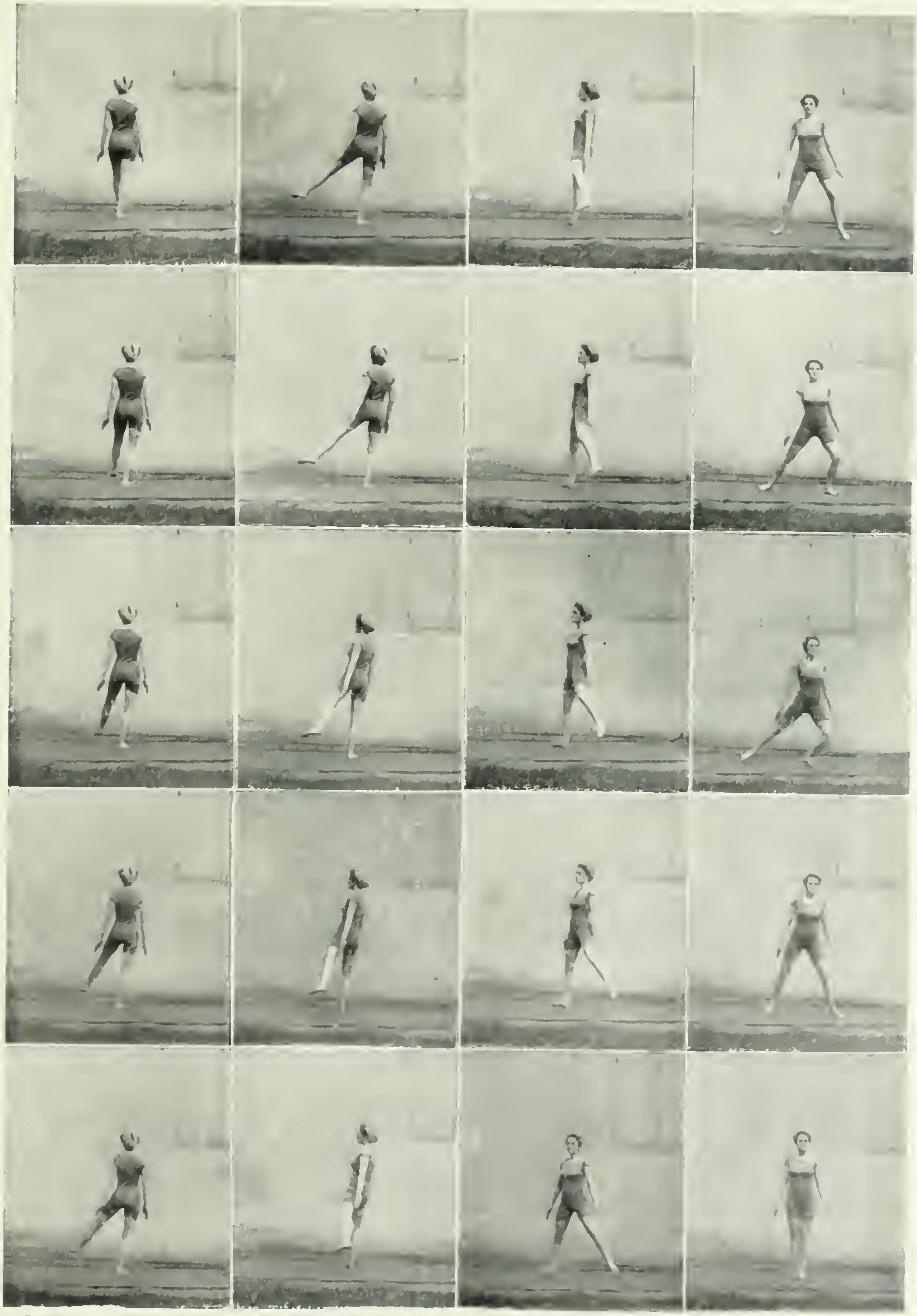
Plate LII.[C] is a fine photograph of this position; it should be noted carefully how the left heel is raised from the ground, and how a line drawn from the middle of the back ends in the ball of the left foot; the Tension of the back muscles may also be seen clearly through the jersey. In this exercise, the whole difficulty will be found in the effort to keep the waist muscles tense. At the start they will bend backwards, so that the sensation of falling back will naturally upset the balance. If by chance the student gets round somehow, he will find, on landing with the left foot on the ground, that these same muscles give way forwards, and that he is unable to prevent a pitch forward. This difficulty constitutes the main interest of this apparently simple exercise; there seems at first sight less movement than in any of the others, only one leg to swing round—and it can't be done! In reality, the difficulty is purely mental, and lies in the impossibility to the beginner of localising movement, of keeping practically the whole body immobile, and concentrating all action on one particular joint. For this reason, this exercise demands a more intense concentration and a far higher vibratory Tension—that is to say, a more absolutely unbroken connection—than any other; and this maximum velocity of vibration is only arrived at through exceptional power in the diaphragm, enabling it to radiate at maximum speed.

Confining myself solely to the physical means by which this condition may be acquired, the effort to keep the waist fully stretched will lighten the difficulties to some extent, and as there is very little physical fatigue connected with this exercise, it may be repeated until the student gets either tired or angry, when it will be wiser to leave it for another practice and come to it again fresh.

The recovery from the side lunge is made by a spring from the ball of the left foot, upwards and sideways, until the body comes once more into an erect vertical line, with both feet pressed close together, well up on the toes. The exercise should be repeated six or eight times on each side, the start being made each time from the finishing position; but this repetition should not be attempted until some sort of mastery has been gained over this very fascinating but inexplicably difficult exercise.

The maximum height reached by the rising curve of the swinging leg should be about twelve inches. A great effort will be needed to avoid bending the knee of the pivot leg, which must be like a steel rod the whole time. Cinema Series No. 8 gives the details of this exercise; it is an exceptionally good one, and in the first three rows there will not be discovered the slightest wavering from the vertical line. I myself was astonished when I saw the photographs, for, on careful examination, there will be seen on the background a faint line, which comes by chance immediately above my head, and this will be found in exactly the same place until the last row, when the side lunge naturally carries the whole body over to the left.

## CINEMA SERIES, No. 8.



*Copyright.*]

Exercise IV. in Detail.

## EXERCISE V

FROM the Preliminary Position, take a step forward on to the toes of the left foot, bringing up the right, also on the toes, very swiftly close to the left, pressing the two feet together, with raised heels touching. Both these steps should be taken with absolutely straight knees. Simultaneously with this step forward, bring the hands together in front as low down as possible, the left hand nearer the body, though not touching it, the palm of the right hand lying along the back of the left; both hands fully stretched to the finger-tips, and forming almost a right angle with the arms. The thumbs should be held erect and tense at right angles to the rest of the hand, a detail which must be carefully noted, in view of the clasping of the hands which follows. (See Plate LIII.[A]) Now comes a swift drop of the body, some five or six inches by bending the right knee and letting the left foot drop well to one side of, and a little behind the right foot, the left knee also bent, but without altering the position of the thigh. These movements should leave the weight poised entirely on the ball of the right foot; the spine remaining vertical as at the start; the left leg held absolutely loose with no weight upon it. The sudden drop of the body is accompanied by as sudden an uplifting of both arms with hands now clasped (the right over the left) and about five or six inches above the head. The details of this position are more readily grasped by photograph than by any amount of description, and Plate LIII.[B] shows them quite clearly. From this position the whole body must be turned completely round in a half-circle, so as to face the opposite direction, but without disturbing the relative positions in any way, and the spin round is executed in the following way:

With the right knee still bent, the body still vertical, the weight still on the ball of the right foot, bring the hands down, tightly clasped, in a rapid semicircular sweep to the right, taking the waist-line as the limit of the curve, keeping the hands close to the body and bringing them again to the same height above the head. If the whole of the body is kept tense and immobile when this swing is commenced, it will be found that as soon as the arms meet with resistance at the shoulders in their swing to the right, this resistance will be enough to start the whole body pivoting round with the greatest ease, as one immovable mass, on the ball of the right foot; and the spin round into the opposite direction will have taken place apparently by itself. This is practically what *will* happen, *provided* the unbroken tension has been maintained, which keeps the perfect vertical line of the whole weight over its pivot. What actually happens with the novice at first, unfortunately, is a complete inability to get round at all. The foot seems glued to the ground, while the waist endeavours

# PLATE LIII.

A B C

 1 2 3

Exercise V.

# PLATE LIV.

A B

*Copyright.*] 4 5

Exercise V. *(continued).*

to twist independently, in the hope of dragging the body after it, a movement which results in the complete upset of the balance and a fall forward.

The movement is most beautiful when correctly performed: a vertical line, turned completely round on its pivot, by the action of a vertical curve working on a horizontal bar, whose point of connection is at the top of the line, the bar being represented by the horizontal line of the shoulders. The arms, working from beautifully loose ball-and-socket shoulder-joints, are able to describe a great part of their curve before encountering the resistance which sets in motion the horizontal bar of the shoulders, and eventually draws into the movement the whole vertical axis of the body, rigid in its connection with the horizontal bar. The great difficulty in this pivoting movement, apart from that of keeping the waist tense, is to prevent the left leg from taking any active part in it, as also to eliminate all needless strength in the arm movement. The left foot should only *just* be lifted off the ground while the turn is being made; a slight movement of the ankle is sufficient, the position of the leg itself should remain unchanged. But we will now suppose the turn has been made, position No. 3 being merely No. 2 facing in the opposite direction. This position is followed by a lunge backwards with the left foot, a movement that demands a gradual sinking back *without looking round*, or indeed making any other movement, except that of lifting the left foot just clear of the ground. This sinking back involves, of course, the gradual straightening of the right knee. Just before this is completed, the arms are brought swiftly down in a full-length swinging curve, past the left side, and up again, with full momentum, above the head, at the same moment that the ball of the left foot comes to the ground at an obtuse angle to the line of the backward lunge, while the left knee bends, lowering the body some five or six inches as the foot touches the ground. Great care will be required to get this position correctly, and the body, as well as the left foot, should now be at an obtuse angle to the original starting position of the backward lunge. Plate LIII.[C] shows the position of the completed lunge, and though in itself the photograph is excellent, I am sorry to say it does not represent the correct angle that should have followed that view of the position given in Plate LIII.[B] For this reason: In doing the whole exercise before the camera, I found that in taking the lunge back from the full-face position of Plate LIII.[B], the foreshortening made it impossible to analyse the position of the feet and knees. I therefore had this one position taken in profile, and to understand how I arrived at the lunge as shown on Plate LIII.[C], it must be remembered that before taking it I was standing where, in the lunge, the right foot is touching the ground, and facing to the left, so that my left side would appear to the spectator. Fortunately, there is an exceptionally fine Cinema Series No. 9, which will at once clear away any confusion that may have been caused, and it is only necessary to study this carefully to under-

# CINEMA SERIES, No. 9.

*Copyright.*]

Exercise V. in Detail.

## CINEMA SERIES, No. 9 *(continued)*.

*Copyright*]

Exercise V. in Detail.

stand quite clearly the sequence of angles. It is most important that the line of the backward lunge should be directly behind the right foot, which, on completion of the lunge, should be stretched to the utmost, and touching only with the side of the big toe, all the weight having been carried back simultaneously with the receding left foot. As this most difficult movement becomes at all possible, it will be found that any attempt to look round on the backward lunge will immediately upset the balance. Only by forcing the will to allow the fall back without fear will the fourth position become possible, viz., that of the reversed lunge. Here, again, the turn of the body is effected by the loose free swing of the arms from the shoulder, but in this curve they descend to their full length and pass well below the waist. When sufficient practice has made possible a careful analysis of what I may call these "motive curves," it will be found that quite half of this curve is completed before any movement of the body begins. But as soon as the half is finished, the momentum of the swing comes against the resistance of the shoulder, and against this resistance the whole body is swung swiftly round into the final obtuse angle at the same moment that the left foot comes to the ground as its new base. From this position, a recovery *back* to the right foot must be made without in any way altering the angle of the body. This is effected by the usual spring from the ball of the left foot, aided by extreme tension of the right leg, so that both feet come together high on the toes, the whole body stretched upwards, the arms still uplifted and hands still clasped. This position is shown on Plate LIV.[A]; and the final one of all is a swift downward sweep of the hands, which descend close to the body and to well below the waist before they unclasp and separate in lateral curves to right and left, stopping finally about eight or ten inches away from the body, the fingers fully outstretched and tense, and the palms facing backwards and slightly downwards. Simultaneously with this downward sweep of the arms, which must be extremely rapid, the feet are lowered, so that the heels are level with although not actually touching the ground, for all the weight must be on the forward part as usual. This simultaneous movement of hands and feet must be so swift and so exact that both cease at the same instant, the heels being brought level with the ground, on the principle of the steam hammer descending to within a hair's breadth of a watch-glass without actually touching it. There must be the same arrestive force in the downward sweep of the arms as in the lowering of the heels. Plate LIV.[B] gives this last position of an extremely complicated sequence of movements, and it will be a long while before repetitions of this exercise become possible. The angle at which it finishes, being one of 45 degrees to the line of the start, the next repetition begins by taking the first step in the same acute angle, and ends at a right angle, beginning again in the right angle and ending in an obtuse, starting on the obtuse, and ending on the half-circle, and so on with three more reflex angles, until the original starting-point is reached.

To make a complete series of repetitions, therefore, the exercise has to be repeated eight times, and it will be very near perfection when the series of eight can be performed, starting from a small chalk circle the size of a quarter, and, *without lowering the eyes once*, returning to it with the last step taken on to the mark! When the first attempts at repetitions are made, two should be the limit, otherwise the student will become hopelessly mixed and neglect the necessary fine detail of the movement in the effort to get the angles correct. Direction, as aim, is entirely secondary, and it will be found that a perfectly performed sequence cannot fail to register correct angles, as the whole secret lies in the centre of gravity, and its relation to its base; if the two remain vertically connected, the angles will be found exact.

## EXERCISE VI

THIS exercise, like No. IV., is a test of extremely difficult balance accompanied by comparatively easy movement. In this particular case, however, the movement is forward instead of backward, which makes the mental control easier, although the physical difficulties are much greater than in No. IV.

From the Preliminary Position, take a fairly long step back with the left foot, turning the body so that it faces a right angle to the original position, while the left foot is placed on the ground at an obtuse angle to the direction of the start. The right foot remains on the ground, with only the extreme point of the big toe touching, and with the instep turned towards the left. In taking the step back, the weight of the body must travel with it, so that the moment the left foot touches the ground, the left knee should bend, with the weight directly over it, lowering the body five or six inches and keeping it poised on the ball of the foot, the heel being raised a full inch from the ground. During these combined movements of body and feet, the hands and arms remain exactly as in the Preliminary Position, and when the body makes the acute angle turn on the first backward step, the movement should be made

PLATE LV.

A

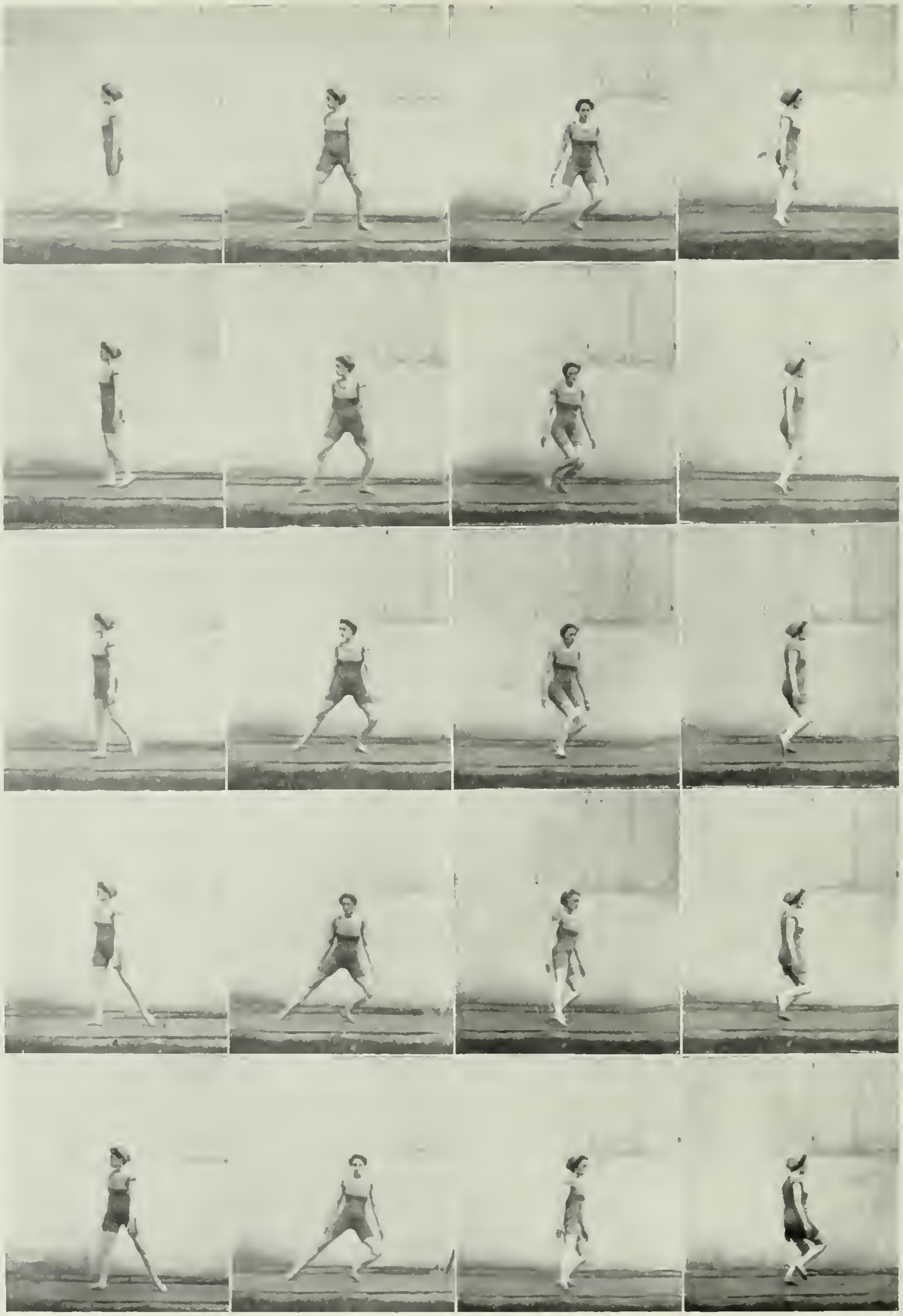
B

 1 2

Exercise VI.

from the hip and not from the waist. During the whole of this exercise, the arms and the torso, together with the head and the neck, remain perfectly rigid; rigid in the true technical sense of the word, that is to say, with their relative positions unchanged. Plate LV.[A] gives the position after the backward lunge, the start having been made on the left of the photograph with the body in profile. The accuracy of the poise on the left foot must be tested by raising the right foot for an instant by a movement of the ankle alone, and if this can be done without disturbing in the slightest degree the vertical line over the left foot, the balance is perfect.

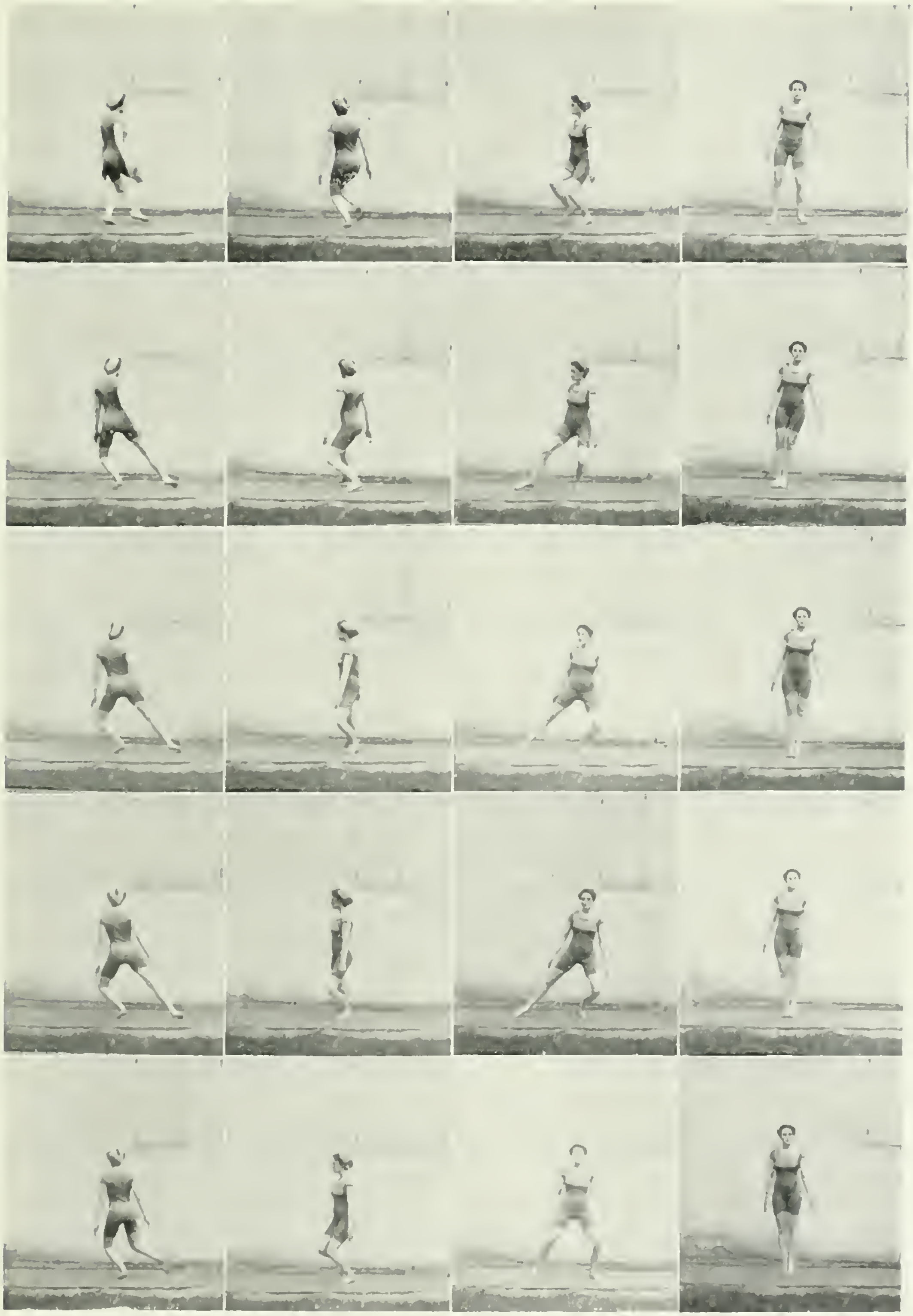
The exercise now consists in turning the body into a fresh right angle to the left, repeating this four times (including the first), which brings the position back to the original starting-point. Each turn must be accomplished solely by a movement of the right leg and the slightest possible turn to the left of the left foot. The preliminary movement for this turn is a drawing up of the right foot close to the left, without touching it, and just clearing the ground, while the left knee remains bent, the right knee drawn close to it. Plate LV.[B] shows this preparatory drawing up of the leg before shooting it out into a fresh right angle, after which the body would be seen in profile, the right side with the extended leg facing the spectator. The right foot must now be shot out as rapidly as possible, at a left right angle to its first position, which movement must be accompanied by the equally rapid turn of the left foot, also to the left. This turn of the left foot is the most difficult movement to make correctly, although it would not appear so. The vertical line of the body having been lowered by the bending knee so that it passes through the points of shoulder, hip, and foot only, the strain of carrying the weight is concentrated on the extensor muscles of the thigh, and the tendon Achilles; and the effort to maintain rigid equilibrium in this position is extreme. When, therefore, is added to this a movement requiring the sudden change of direction of the body while undergoing this exceptional strain, without altering any one of the relative positions, the difficulties will be obvious. In Exercise V. the initial movement of the arms was that which started the vertical line of the body (with bent knee), revolving on its pivot, a movement which, working as it did from the more powerful leverage obtained by height, was able to effect the turn of the whole body with literally no effort. In the present case, the arms are rigid and immovable, therefore the whole of the effort is confined to the muscles of the foot, which must be so strong in Tension that they are able to make the turn even with the weight above them. This is not only possible but quite simple if the whole body is equally tense, in which case, it will be remembered, there is no aggregate of weight at any one point, the elasticity of the Tension keeping it as a moving quantity. Therefore, the movement of the left foot is merely the signal for concerted action, and, like the flash of a chameleon's tongue, the right leg shoots out into





Exercise VI. in Detail.

# CINEMA SERIES, No. 10. *(continued)*.



*Copyright.*]

Exercise VI. in Detail.

fullest Tension, the left foot has turned, and the whole body is at a fresh angle, without the alteration of a hair's breadth in any of the relative positions. The drawing up and shooting out of the right leg should be a rapidly-continuous movement, and, when it is performed correctly, the toe comes with the barest touch to the ground; the outline traced by the curve of the leg movement being that of an arc of a circle. The great difficulty will be to localise the movement to the right leg and left foot, especially in the shooting out. The body is bound to topple over at first, and the weight will sway to the movement of the leg on account of the weakness of the left knee when bent, unused, as all modern knees are, to making any independent movement. It will be a long while before it is able to hold the whole weight of the body immobile on the strength of its own particular muscles. But when that is achieved, it is a beautiful movement; rapid and silent and definite, as each change shoots the whole position into a fresh angle. And so on, till the four are accomplished, and later on eight, or twelve, or even more; but this is a test for very perfect knee muscles, and more than six rounds, viz., twenty-four changes, should never be attempted, even by the most perfectly trained muscles.

The recovery is a light spring from the left toes backwards, and upwards, which brings the body again into an erect position, with both feet pressed close together high up on the toes. Again the cinematograph speaks clearer than the most lucid explanation could ever do, and Cinema

Series No. 10 is worthy of the most careful study. The vertical immobility of the torso is admirably demonstrated by the position of the head in connection with the side line of a closed window which is seen in the background. From the third row, right on to the last row but one, the relative distance of the head from this line never changes, although it must be remembered that the body has changed into three different angles in this interval.

## EXERCISE VII

THIS exercise is, like the second, an example of the triangle of forces, finishing in exactly the same position as Exercise II., although arrived at in a totally different way. It will be remembered that in Exercise II. the backward and upward swing of the right leg is, so to speak, the motive force of the sequence. In the case of Exercise VII., the whole effort is concentrated on preventing this leg movement until the last moment, when the leg flies up of itself irresistibly.

From the Preliminary Position, raise the hands to the first position of Exercise II., viz., the right hand with clenched fist raised to the shoulder, the hand turned as far round to the left as possible, the elbow bent and kept as closely to the waist as will allow the forearm to remain nearly vertical. Simultaneously with this movement, the left forearm is brought across the waist in a horizontal line, the hand also clenched. In this position, and taking great care not to disturb the shoulders, force up the right hip by lifting the right heel as high as possible until only the extreme point of the big toe touches the ground, keeping the knee absolutely straight, the whole leg tense and unbending. The details of this extraordinary position are quite clear on Plate LVI.A The extreme limit of Tension in the right leg can only be obtained by bending the body to the left, which must be done very slowly, keeping the head vertical, so that, as the body bends over to the left and slightly forward, the head remains stationary, while the right shoulder, by means of the bending neck, gradually comes quite close to the right cheek, not lifted specially, and above all not hunched up in any way, but brought near by the lowering of the left shoulder away from an immovable head. The bend of the body to the left must take place at the waist only, so that the left leg, as base, may remain absolutely vertical, the foot flat on the ground. It is most important that in this bending over of the body from the waist, there should be only a very slight lean forward, the direction of the bend being almost a right angle from that in which the body faces. Plate LVI.[B] shows this side bend when it is about half completed. Now comes the moment when the Tension plus the weight of the leaning body make it difficult to keep the right toe on the ground, but this *must* be done until the bend reaches the utmost limit, paying out the weight and drawing out the muscles of the right leg, until it can bear it no longer, when in an instant the body actually overbalances, and apparently the whole position is lost! But no, it is just this overbalancing that releases the tension on the right leg, and up it flies like a willow branch that has been held down, just at the exact moment when the poise seems irrevocable It is here that the principle of the triangle of forces comes into action, and the outward and upward swing of the right leg counteracts the falling body by throwing out a weight

PLATE LVI.

A B C

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Exercise VII.

PLATE LVII.



4
Exercise VII.

in a horizontal line at a sufficient distance to form a reaction strong enough to pull the body back into balance, provided always there is that perfect connection of every muscle through complete Tension. Plate LVI.[c] is a very fine example of this poise, which is extremely difficult to maintain for any length of time. At the moment of this re-established poise, the left hand is pulled round to the left shoulder, drawing the body round in a rapid turn to the left; at the same moment the waist, with a quick little twist to the *right*, readjusts the body squarely over the left foot, which has acted as pivot in this movement, and will now be at a right angle to its first direction, having spun round on the toes. The twist of the waist is accompanied by the inward turn of the right hip and consequently the altered position of the whole leg, which is now turned so that the sole of the foot is facing upwards. Here, then, is the exact position of the poise as shown in Exercise II., and Plate LVII. shows it exactly as it took place. It will be noticed that the outline is blurred, and this is accounted for by the extreme rapidity with which the turning movement has to be made from the poise of Plate LVI.[c] Although my photographer wished to retouch the outlines, I preferred to keep it untouched as is the case with all the photographs, that they might above all be absolutely true. The recovery is naturally the same as that given in Exercise II., viz., by raising the body and lowering the right leg simultaneously, without relaxing the Tension of the line formed by the locking of the spine and the right leg. The head makes no independent movement, but is carried into the right-angle turn with the body, and is left free and erect by the squaring of the shoulders which is the result of the waist twist. After the final recovery on to the toes, the position should be maintained, as with all exercises, sufficiently long to make quite sure that the balance is secure.

This particular exercise is exceptional in its movements of the sciatic muscle which occur at the moment of the simultaneous twist to the *right* of the waist, and inward turn to the *left* of the right leg; these two movements combined place the muscles of the lumbar region at their highest pitch of Tension, muscles which as a rule are given little or no share in any exercise, but which in this particular movement are called upon to bear the main responsibility of a perfect poise. One moment finds the body bent sideways on fully-stretched abdominal and loin muscles; the next finds it presenting a full face to the direction in which the side bend was made, the twist having been made by the small of the back on a tense pivot. The importance, therefore, of this particular exercise from a purely physical point of view is obvious, for the large majority of men and women, especially women, suffer from weakness in these particular muscles.

As the final recovery is identical with that of Exercise II., a second photograph has not been given, and reference can easily be made to Plate L.[c]

Four repetitions of the exercise will complete the series, each ending at a right-angle turn, but with this difference, that whereas in the first case the pivot itself describes a small square as the body

# CINEMA SERIES, No. 11.

*Copyright*]

Exercise VII. in Detail.

## CINEMA SERIES, No. 11 (*continued*).

*Copyright.*]

Exercise VII. in Detail.

changes direction, in the second it remains stationary, each turn being made by the movement of the foot alone, without change of place. In Cinema Series No. 11 will be found some fine positions, notably Nos. 13 and 15, which have been enlarged for the better study of the actual turn.

## EXERCISE VIII

THIS exercise will at first sight seem a retrograde movement, on account of its apparent simplicity, but it is just this simplicity and ease which make it so hard to achieve. Apart from this, each sequence ends at an acute angle, making a series of eight repetitions, which in itself trebles the difficulties, and the movement is so peculiarly continuous that the general impression of the eight repetitions is that they form a circle. As a matter of fact, this is what they do, and this makes it much more difficult to judge each angle correctly, and to arrive at the finish upon the actual starting-point.

The start is, as usual, from the Preliminary Position, and begins by raising the hands as in Exercise I. This is followed by a short step back with the left foot, leaving the right with only the extreme point of the toe touching the ground, both knees perfectly straight and tense. Plate LVIII.[A] shows this position. Now, without altering the position of the feet, carry the uplifted arms and shoulders right round to the left until the arms form a right angle to the direction of the feet. This is a movement made by the waist and hips, which twist the whole of the upper part of the body to the left, without disturbing the position of the legs. (See Plate LVIII.[B]) When the

# PLATE LVIII.

D C B A

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Exercise VIII.

right-angle turn of the shoulders is completed, the movement must be carried on without the least pause by the right foot, which comes round and back in a sweeping inward curve, until in line with the left foot. This places the right foot about fifteen inches back, and the same to the right of its first position, which really means that it is now about a foot length and a half behind the left foot, and pointing at an acute angle to its first direction. As the right foot touches the ground, the knee should bend, lowering the body about five inches. The left foot should now be touching the ground with the extreme point of the big toe, and although the heel will be well raised, the direction of the whole foot should be exactly the same as it was when having taken the first step back, while the right foot will be pointing to the left, in an acute angle to its first direction. These details are extremely intricate, but Plate LVIII.[C] will, I hope, render them comprehensible. The greatest care must be given to the study of the different positions of the feet, as these are of the utmost importance. Now comes a free upward swing of the left leg into the acute angle midway between the line of the start and the right-angle turn. After reaching a horizontal line, it swings back to the right foot, which, on the upward swing, should rise right up on to the toes, with the knee still bent. (See Plate LVIII.[D]) On the downward movement the right knee straightens up to meet the left foot, so that both may come close together in the effort to bring the body into an erect poise. Simultaneously with the upward swing of the left leg, the arms must swing down to the left side to counterbalance the leg movement to the right. These movements will be recognised as very similar to those of Exercise I., and the recovery, as in the case of the first exercise, is made by carrying the arms up to their first position at the same moment that the left leg is lowered.

The final direction of feet and body will be into an acute angle from the first line, and in this position lies the difficulty of the repetitions. It means the complicated mental performance of making a right angle turn from an acute angle position, and it is quite useless to trust to the eyes to find land-marks. It is the *feeling* of the position which will be the test of an accurate angle, and the whole attention should be directed towards the perfection of each detail, which alone will give correct angles.

The most important thing in this exercise is to keep the movement continuous and smooth. This does not apply to the repetitions only, but to every change of position in the single sequence, as, for example, the immediate carrying-on movement of the right leg, as soon as the body has been turned into a right angle, the immediate bend of the right knee as soon as the foot touches the ground on its backward step, the immediate upward swing of the left leg the moment the right knee is bent, and the equally rapid lowering of the left leg as soon as the horizontal line has been reached. And so on, like a wave, rising and falling, should be the movement of this apparently simple yet unaccountably difficult exercise. The torso remains throughout vertical and practically immobile, except for the turn of the waist on the second movement. Unfortunately, the Cinema Series of this exercise has been mislaid, but the large plates are so exceptionally full of detail that there will be no difficulty in arriving at a clear understanding of the changes of position. There is, however, a Cinema Series representing a combination of two exercises in which this fortunately happens to be one. In Cinema Series No. 15, therefore, the first two rows and a half represent the whole of this exercise before it merges into a second, and a reference to this series will provide all the details necessary for the single exercise.

## EXERCISE IX

THIS exercise needs great care, because, unless the details of each change of position are followed out accurately, the movements may become too great a strain. But given the necessary caution, there is no need to fear an over-strain. If the other exercises have been patiently studied, the muscles of the diaphragm and the waist will have become so much stronger that they will be quite ready to undertake the whole strain of this movement, or, to be more accurate, share it with the knee muscles, for the whole strain is concentrated on the inside muscles of the knee and those of the diaphragm and waist: sets of muscles which are rarely if ever called upon to play a really important part in any of the usual exercises. This concentration of effort on two sets of muscles does not mean that no others share in the movement. All are vibrating with tense alertness in the effort to disperse the weight in order to relieve the two points of special strain, and it would be impossible to achieve any sort of success with this particular exercise unless the Tension were complete.

Begin, then, from the Preliminary Position by taking a rather short step forward on to the ball of the left foot, and instantly spinning round on it into a left right angle,

PLATE LIX.

A B C

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Exercise IX.

while at the same moment the right foot makes a long lunge to the right side in such a manner as to lower the body five or six inches on bent knees, the weight equally divided between both feet, which should be well turned outwards. The spine should be kept quite still and vertical, and the arms should hang straight down at each side, tense as to muscle, but quite loose and free at the shoulder socket. Plate LIX.[A] shows the position as it should be after having made the right-angle turn. The three movements that go to make up this turn, the spin on the left foot, the side lunge with the right, and the bending of the knees, should all be done simultaneously with the utmost rapidity, and in studying Plate LIX.[A] it must be remembered that the start was made facing the spectator. Great care must be taken to maintain the weight of the body exactly between the two feet.

The movement which follows is a backward lean of the shoulders, together with a simultaneous push forward of the hips and a turning in of the knees, and the farther back the shoulders are able to lean, the farther forward must come the hips and the nearer together the knees. The hip movement forward is to counterbalance the backward lean of the shoulders, and the narrowing of the distance between the knees is to avoid what would otherwise be a dangerous strain on the groin muscles. With the turning in of the knees comes a similar inward lean of the feet until the outside edge of the sole is raised quite clear from the ground, and all contact is on the inside of the foot, as far as the ankle, which eventually lies over on the ground. This turning in of the knees and feet leaves unstretched the abdominal and groin muscles and makes possible an extraordinary backward lean on the strength of the diaphragm alone, and, what is more, without the least strain, except indeed on the inside muscles of the knee, which are stretched to their utmost by the increase of the bend as the body is lowered. Plate LIX.[B] should now be studied, so that the position of the head and the angle of the body may be noted. Here it is wise to insert a caution against any attempt to lean back before the knees are brought together, for if this is tried, instantly a great strain and dragging will be felt on the abdominal and groin muscles, which is most harmful. No exercise that causes pain can be right. Muscles which have been overstrained never reach their full power of elasticity—on the contrary, contraction and hardening is the inevitable reaction of overstrain, a condition known among athletes as "muscle-bound." In the case of this particular exercise, the turning in of the knees relaxes all the abdominal and groin muscles, and allows direct leverage between the diaphragm and the foot.

While in the position shown on Plate LIX.[B], the body should be swayed backwards and forwards, great care being taken not to straighten the knees in any way, but only to widen or close them according as the body sways forward or backward; widening, of course, on the forward movement, narrowing on the backward, quicker and quicker as the strain becomes less, but never repeating more than six times at a break. The forward movement is merely the return to the vertical, and is therefore a negative one in relation to the first position.

I hesitated a long while before adding Plate LIX.[c], on account of the danger of premature attempts to arrive at it, and I most strongly advise that it should be left alone by all whose muscles are not in the very finest condition.

It might appear quite a simple matter to drop on to the knees in this position, and so it would be. But now study the photograph. The knees are *not* on the ground; they have been lowered slowly, slowly, until within an inch; even the calves of the legs are not touching, as will be seen by the faint line of light between them and the ground. The effort is terrific, and the whole beauty of it lies in the strong muscular control that forces the knees to bend slowly, slowly, until they reach to within a fraction of the ground, and then, *as slowly*, rise again; *that* is the difficulty. Going down is hard enough—look at the muscles of the neck standing out through the jersey; look at the diaphragm, it is like a board—and then picture the strength of the foot and knee that are going to reverse that tremendous strain without an interval, without any definite point of leverage. It is the diaphragm that leads, and the feet and knees obey.

Perhaps, too, I have added this photograph from a little feeling of conscious pride in being able to prove what even forty-seven-year-old muscles are able to do *when finely trained.*

And now, after this exercise, evolved solely for the strengthening of the diaphragm, another follows which has been thought out with a view to suppling the same muscle.

## EXERCISE X

THIS exercise consists in moving in two different directions at the same moment.

It was done by the Egyptians and by the Greeks, and later by the Parthians, who survive to this day as a small clan in the heart of Thibet, where they were recently discovered by the French explorer, Mons. D'Ollon. He describes how among this remnant of the Parthian tribe may still be seen men who run in one direction and shoot in another, the origin of the expression "a Parthian shaft."

In this exercise the whole body is braced into the utmost Tension, and the upper and lower parts will work against each other, with the diaphragm as an axis on which each half may turn in opposite directions.

From the Preliminary Position, begin by taking a short step forward with the left foot, bringing, as usual, the whole weight on to the ball of the foot, the heel just off the ground, and only the toes of the right foot touching the ground, the arms hanging straight and tense at the sides, with clenched fists. Plate LX.[A] shows this position, and while studying the photograph it must be remembered that the actual advance is going to be made *towards the spectator*, while the incentive movement, if I may use such an expression, will be to right and left. As soon as the step is completed, swing the arms round as far as possible to the left until they have made the shoulders and the head complete a right-angle turn. They will now be facing the direction in which the actual advance of the body is to be made. Plate LX.[B] shows the position when the arms have been brought round, and it will be noticed that the face and shoulders are looking directly over the left hip. The next movement consists in a complete swing round on the ball of the left foot, which should now face the opposite direction, while the right takes the place of forward foot with all the weight upon it, leaving this time the left toes on the ground. The rapid turn of the feet will now bring the right hip to the front, and simultaneously with the leg movement the arms must swing in the opposite direction, as far as they can, to the right, to prevent the shoulders from moving, so that each time the swing of the hips is made directly to right or left, the arms swing in the opposite direction, while the head and shoulders remain rigid, advancing always in the same line of sight. Plate LX.[C] shows simply the reversal of the movement. The black line behind the head was placed for the purpose of showing how very slight is the deviation of the body from the direct line of advance, in spite of the lateral movement of the feet with each step, which, when completed, represents an advance of from six to eight inches. These last two photographs were taken without any interval between the two movements,

# PLATE LX.

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Exercise X.

except that necessary for raising the camera shutter preparatory to taking the second, so they are strictly sequential. Throughout the whole of this exercise, the knees must remain braced into full tension, each step being taken as one movement from hip to foot. Six or eight steps should be the limit for the first attempts, but eventually twenty-five or thirty may be done without strain.

A careful study of the photographs should be made, with a view to a thorough understanding of the foot positions, remembering that the ball of the forward foot is the momentary pivot during the swing round, but that the weight of the body comes instantly on to the other foot, the moment it has been brought round to form the new pivot.

These last two exercises have been specially thought out in connection with the diaphragm and waist muscles, and having less variety of movement than the others will probably prove less interesting. On the other hand, what movement there is will be found more difficult than any other, and for this reason these two exercises have been postponed until the muscles have reached that condition of strength and elasticity which makes them possible.

No cinematographic series exists at present of the two, as they were only thought out after the others had been taken, and were unfortunately too late to be included with them.

## EXERCISE XI

NOW comes the most beautiful of all the exercises, in which positions occur more striking and more varied than in any other. As there are many details which cannot be seen when doing the exercise in profile, two series of photographs have been given in this case; one taken in profile and one full-face. Besides these, the cinema series gives all the intermediate changes.

From the Preliminary Position, take a short step forward on to the ball of the right foot, bringing the whole weight over it in a vertical line, leaving the left leg stretched, behind and slightly to the left side, with only the extreme tip of the big toe touching the ground. As the step forward is being taken, the right arm should be raised simultaneously in a position of parry, the forearm just above the head and about five or six inches in front of it, the fingers tense and outstretched, the palm of the hand turned outwards. Plate LXI.[A] illustrates this first position, in which the spring of the feet should be specially noted. The left arm should hang straight and tense, well away from the left side. From this position a very rapid vertical drop should be made on the ball of the right toes until the knee is so bent that the thigh is horizontal and the body actually sitting on the right heel.

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# PLATE LXI.




Exercise XI. (Profile View.)

When speaking of this movement as a "drop" on to the heel, I do not mean that the movement may be either jerky or uncontrolled; on the contrary, the greatest muscular control is required to enable the bend of the knee to be performed with the greatest rapidity without disturbing in the slightest degree the vertical poise of the body. The effort is divided between the muscles of the diaphragm, knee, and foot, the diaphragm maintaining the poise, while the knee and foot lower the weight. Simultaneously with this drop comes the bend of the left knee in such a manner that the foot and knee lie over on the inside close to the ground, although only the foot touches it, the sole lying at right angles to the ground, facing backwards. The arms change position as the knees bend; the right being brought down from that of parry to one of attack; the fist clenched, the elbow close to the side, but slightly in front of the waist line. The left arm should reach well forward, nearly at full length, and with open hand, to about ten inches to the left of, but exactly level with, the right knee. Plate LXI.[B] shows this position in profile. The great difficulty of this movement consists in keeping the line of the body absolutely vertical over the bending toes of the right foot without once leaning forward during the drop, but if perfectly executed it will be found that the right thigh is at a right angle to the spine, and the right toes at a right angle *to the instep;* this latter detail being an impossible achievement for the untrained foot. In the profile view of this position, the right foot is hidden, but it can be seen in the full view. (See Plate LXII.[B]) From this crouching position, the right knee should now be made to touch the ground, levered forward on the toes of the right foot, a still greater test for the toe muscles; while the torso remains absolutely motionless and vertical. The moment the knee touches, the whole weight of the body should be brought forward, though not allowed to rest on the knee for more than an instant, but, passing on, be brought to a vertical poise over the right hand, which reaches forward to form the new base. The whole arm should form a vertical line from the shoulder, and almost the entire weight should be over this line, for in the reach forward the right foot is entirely relieved of any weight, and even the left foot, which will have been drawn forward about ten inches, will be touching the ground with only the extreme point of the toe, so that it forms quite a secondary support. On the completion of this same reach forward, the right knee must be lifted well off the ground, while at the same moment the left hand is clenched and drawn right up to the left arm-pit, so that the left elbow is bent to its limit and remains in vertical line above the shoulder. This line should, if the position is correct, be able to pass unbroken through the right shoulder to the right hand.

The whole of the front of the body should be facing the left, while the right toes remain in exactly the same spot through the whole exercise, although, as will be seen, they become still more bent over on the reach forward. In lifting the right knee off the ground as soon as the

PLATE LXII.

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Exercise XI (Full View).

right hand is placed as base, great care must be taken not to allow this movement to disturb any of the other relative positions.

The first attempts nearly always produce a hunching up of the back because of the difficulty of keeping the hip-socket loose; but if this is free the movement of the leg need in no way affect the spine. Plate LXI.[c] shows this fine poise, which is a very perfect example of movement, restricting the body to its narrowest limits within two planes, and is almost a better example of this than the much-disputed Discobolus of Myron. It will be noticed that in the reach forward the left leg has straightened into the utmost Tension, and it is just the tension of this leg which is the key to what otherwise would be an impossible balance.

After a moment's pause in this position, the recovery begins by replacing the right knee on the ground, and drawing up the left foot level with, and about four inches to the left of it, at the same moment the body is raised once more into a vertical line, while the arms hang straight down at the sides, about ten inches away from the body. (See Plate LXI.[D]) The weight is now fully over the right knee, and the final movement consists in transferring it to the left foot and rising in a vertical line, just as the descent was made over the right, which brings back the first position, with this difference, that the left foot is forward. The repetition may now begin by once more bringing the right foot forward, with the uplifted arm, and so on through six or eight of these beautiful sequences of a rising and falling line; swift, smooth, and vertical, on the springs of knee and foot. Plate LXI.[E] shows the position of the final recovery. The fine full-view positions of this exercise are very successful photographs; the first is probably the finest example of vibrating Tension in the whole book, the feet seeming barely to touch the ground. This sequence is illustrated by Plates LXII.[A], LXII.[B], LXII.[C], LXII.[D], and LXII.[E]

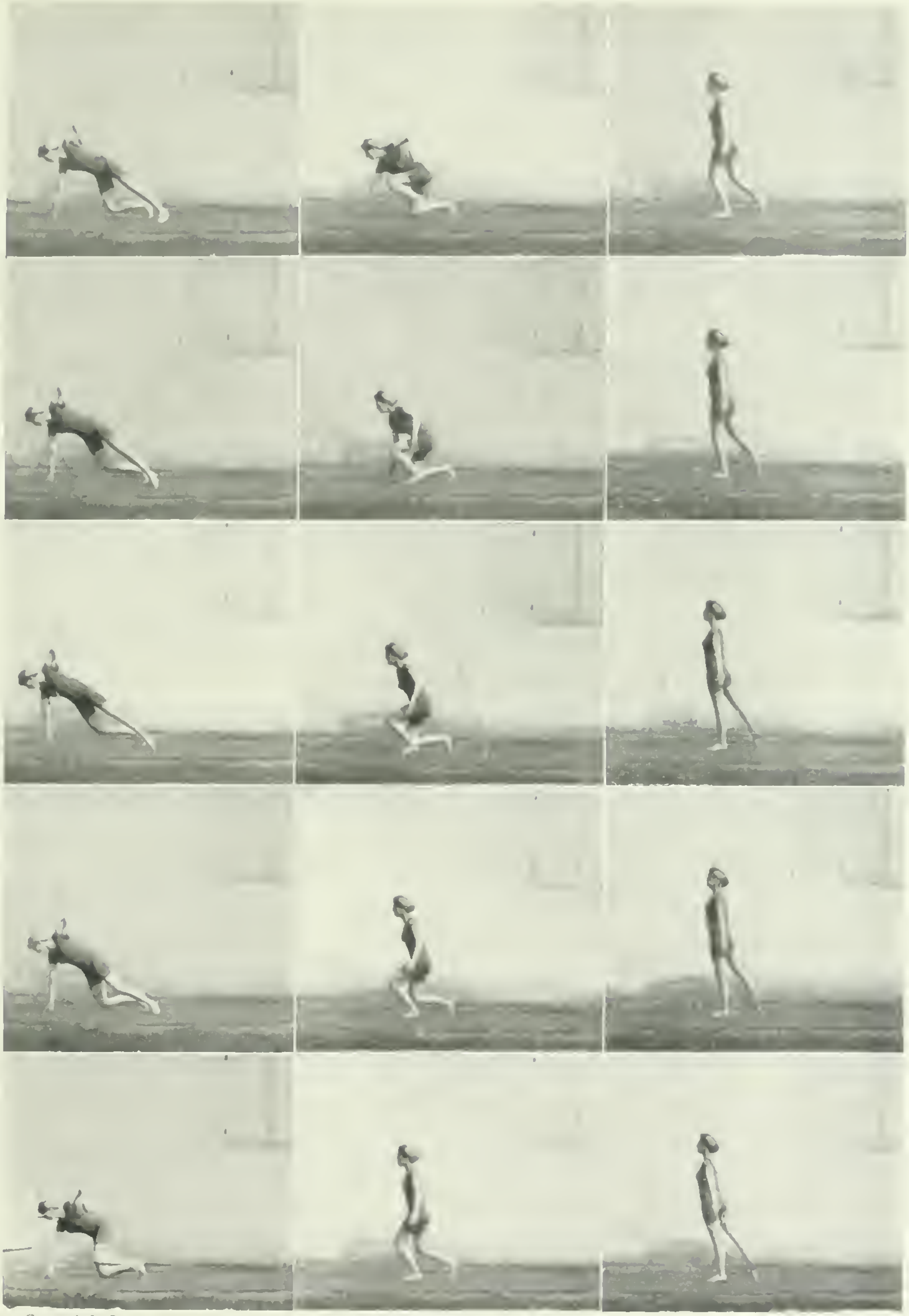
In the second position of this full-view sequence, note carefully the angle of the left knee, which is quite clear of the ground.

Cinema Series No. 12 shows all the intermediate positions of this exercise, especially those taken in the rapid drop of the body, where once more it may be seen that the head descends in the same unwavering vertical line, if compared carefully with a little mark on the background directly behind it.



Exercise XI. in Detail.

# CINEMA SERIES, No. 12 *(continued)*.



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Exercise XI. in Detail.

## EXERCISE XII

WE come now to the last exercise, in which the test of mental and physical control is equal, and both required at their maximum.

From the Preliminary Position, take a step forward with the left foot, and bend over till the spine is horizontal, stretching the arms behind, also horizontal, with clenched fists, the face raised, with the line of sight still horizontal. This movement will bring the weight entirely over the ball of the left foot, the heel of which must be at least half an inch from the ground. The right foot will be touching with only the extreme point of the big toe, and all the muscles up the back of the leg will be stretched to their utmost by the bending forward of the body. Care must be taken not to let the head drop forward or the balance will be impossible. Plate LXIII.[A] shows this position, which was unfortunately snapped a moment before the spine reached the horizontal line, but as the Cinema Series No. 13 has some very perfect positions, it is of no importance.

From this position, a long lunge back must be taken, *without looking round*, a movement which constitutes literally a fall back, the actual fall being only saved at the last moment. It is here that the will is put to such an unusual test. The instinct to look round while falling back is so strong that it will be a long while before the beginner can overcome the desire. It is just this looking back which upsets the physical balance, a result right and logical in principle: for, where hesitation and uncertainty and fear take hold of the will, the action that follows must of necessity be unreliable. As the right foot is lifted from the ground preparatory to its lunge back, there must be no alteration in the position of the body or the head, both being allowed to fall back as one combined weight, without the least resistance. Back, back, they must fall, while the right knee bends more and more to avoid touching the ground with the foot, which would check the movement. The left knee should remain straight until the last moment, when the torso and head are raised, and turned like a flash right round to the right until they have made a complete half-circle, which will leave them facing in exactly the opposite direction to that of the start. This turn is aided by the movement of the right arm, which is swung round until the hand is level with the right shoulder, the elbow bent to its utmost, the fist still clenched. The left arm during this movement should also bend, but in an opposite direction, for it remains behind the back with the forearm lying horizontal, and with the back of the clenched hand touching the body. The right foot comes to the ground at the same moment that the body makes the half-circle turn, the right knee very much bent, the foot itself turning slightly to the left (to be exact, it should form an acute angle to

# PLATE LXIII.

C B A

 3 2 1

Exercise XII.

the direction of the body), while the torso is facing full and squarely in the opposite direction to that in which it started. The hips should be facing the same acute angle as the right foot, the shoulders alone having squared to the half-circle.

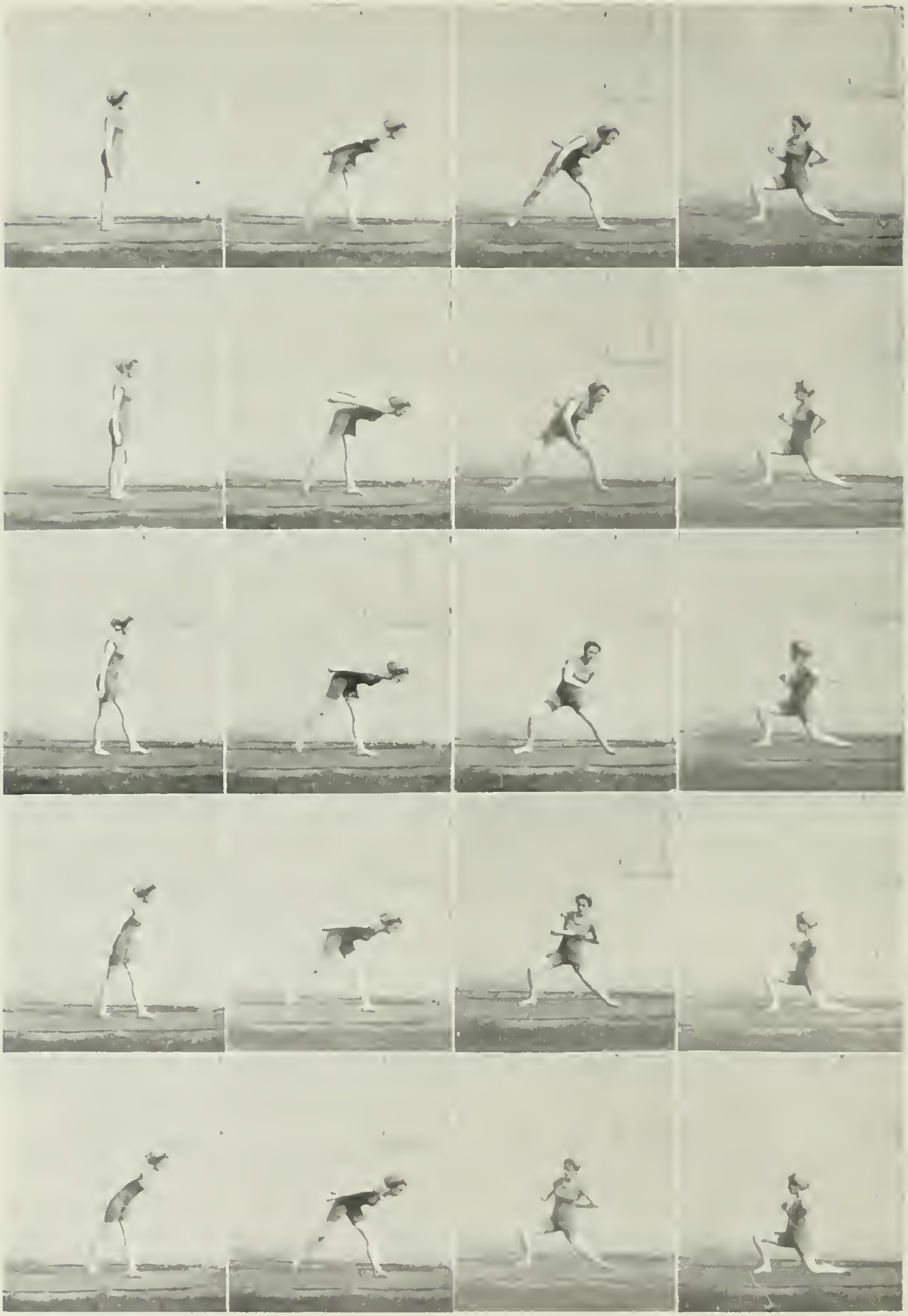
We left the left leg with the weight of the body rocking back upon it. At the moment of the turn, the left foot should also turn on the heel to a right angle, and as the right foot touches the ground the left drops over on its inside line, so that the ankle is on the ground, the knee bent, and lying over, the under side almost touching the ground. The whole of this position will now be clearly understood if Plate LXIII.[B] is carefully studied, as the photograph shows admirably every detail. It will be noticed that the torso is vertical, and that the whole weight is directly over the left knee, which, however, is not on the ground, so that the knee constitutes what one might call a suspended base, being directly under the centre of gravity, but not needed, owing to the strength of the knee muscles, which form so strong a point of leverage that the weight can, through their movement, be transferred instantly to either the right or left foot. Having arrived at this position, test the spring of the knees by raising and lowering the torso, always in a strictly vertical line, the left knee rising about ten inches above the ground, and descending to about one inch, but never actually touching. This is one of the great knee tests, as the whole strain of the spring movement falls on the inside muscle of the left knee. But, if you reach a condition which enables you to make this movement with ease, what wonderful knees you will have! Priceless springs of steel that feel no strain too great to bear; and therefore this test of rising and falling on one set of springs will produce a feeling of great exhilaration without the least fatigue. Make the last upward rise simultaneous with a strong spring back from the ball of the right foot and a straightening up of the left knee, and you will have lifted your whole body into line once more, back on to the left toes, drawing the right foot close to the left, the arms still in the position shown in Plate LXIII.[B]

The final movement is a lowering of the arms to the sides, tense, and with outstretched fingers, while the body remains on the ball of the toes, light and vibrating from the spring. Plate LXIII.[C] gives the position just before the arms are lowered, after which the final movement leaves the whole body in exactly the same position as that in which it began these exercises.

To those who have been able to follow them through to the end, working patiently for their perfect accomplishment, I would say what Nestor said to Atrides, in the *Iliad*: "Suppose thy nerves endow'd with strength superior, . . . King of men, command thou then thyself." And it is indeed a "strength superior" that will vibrate through nerve and muscle trained to understand the meaning of Tension: the power of a full and complete activity.

Cinema Series No. 13 will make clear any difficulty which has not been explained, and an enlargement of the twenty-second position has been added for the

# CINEMA SERIES, No. 13.



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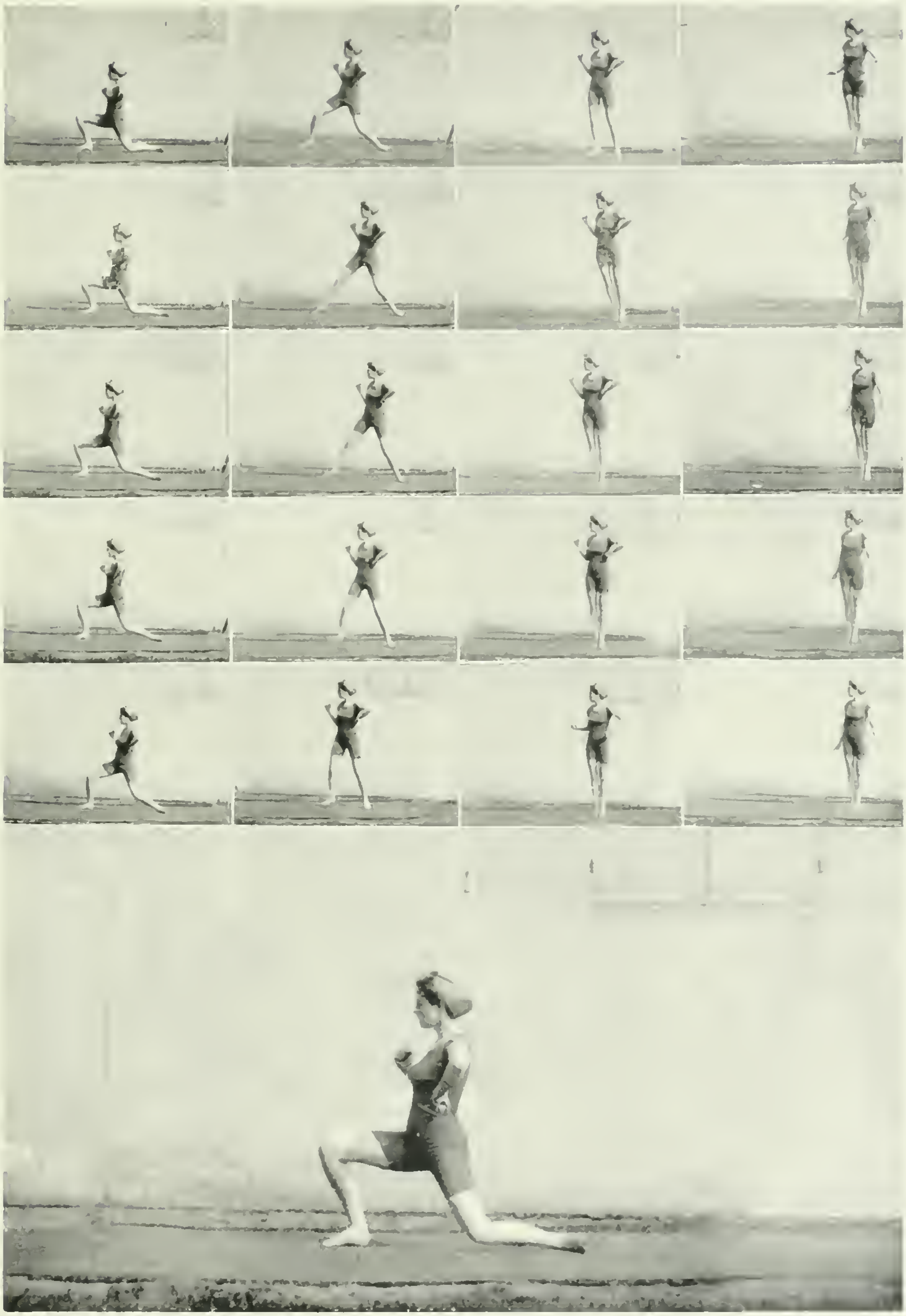
Exercise XII. in Detail.

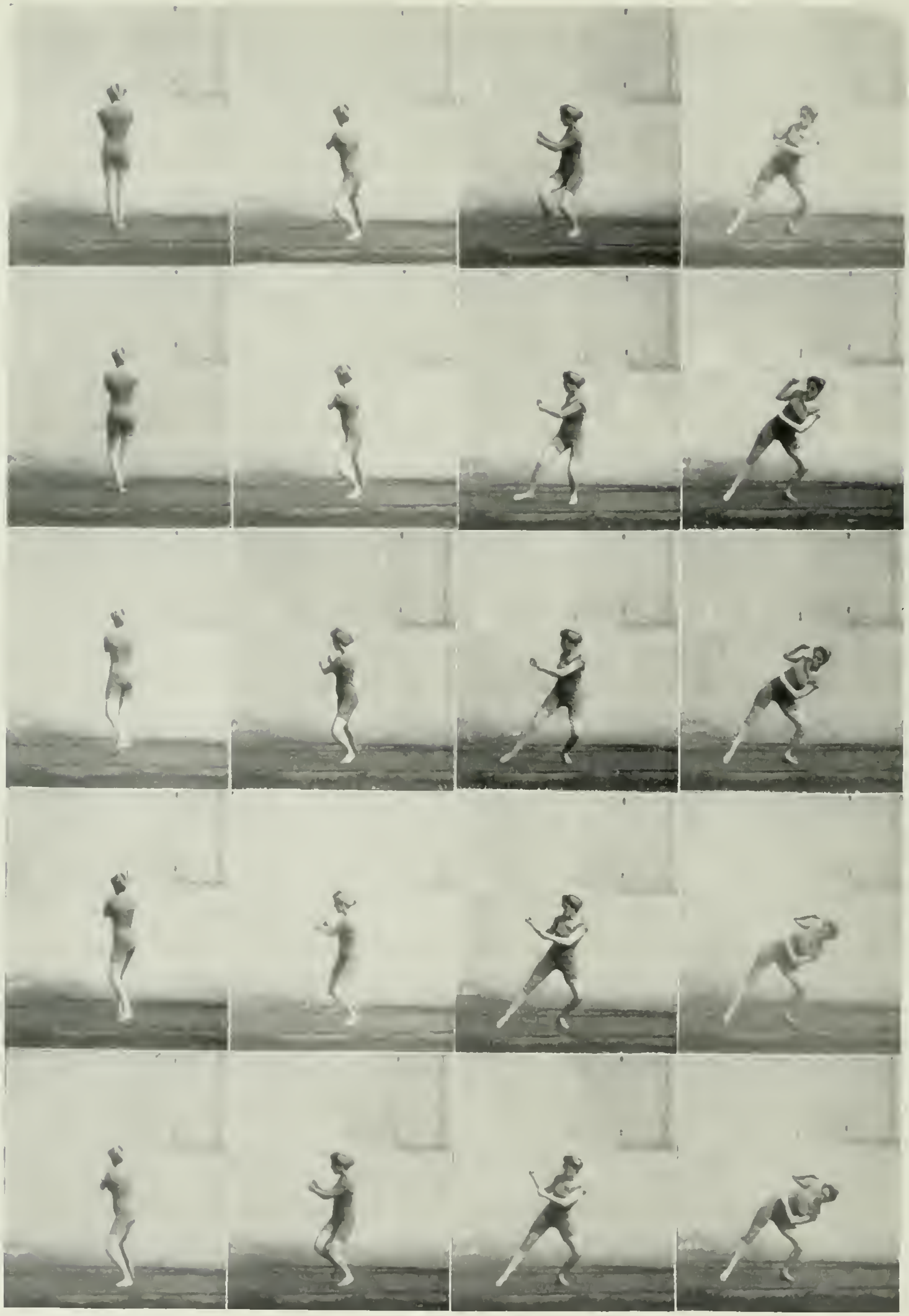
# CINEMA SERIES, No. 13 (*continued*).





Exercise XII. in Detail.

# CINEMA SERIES, No. 14.



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Combination of Exercises VI. and VII. in Detail.

# CINEMA SERIES, No. 14 *(continued)*.

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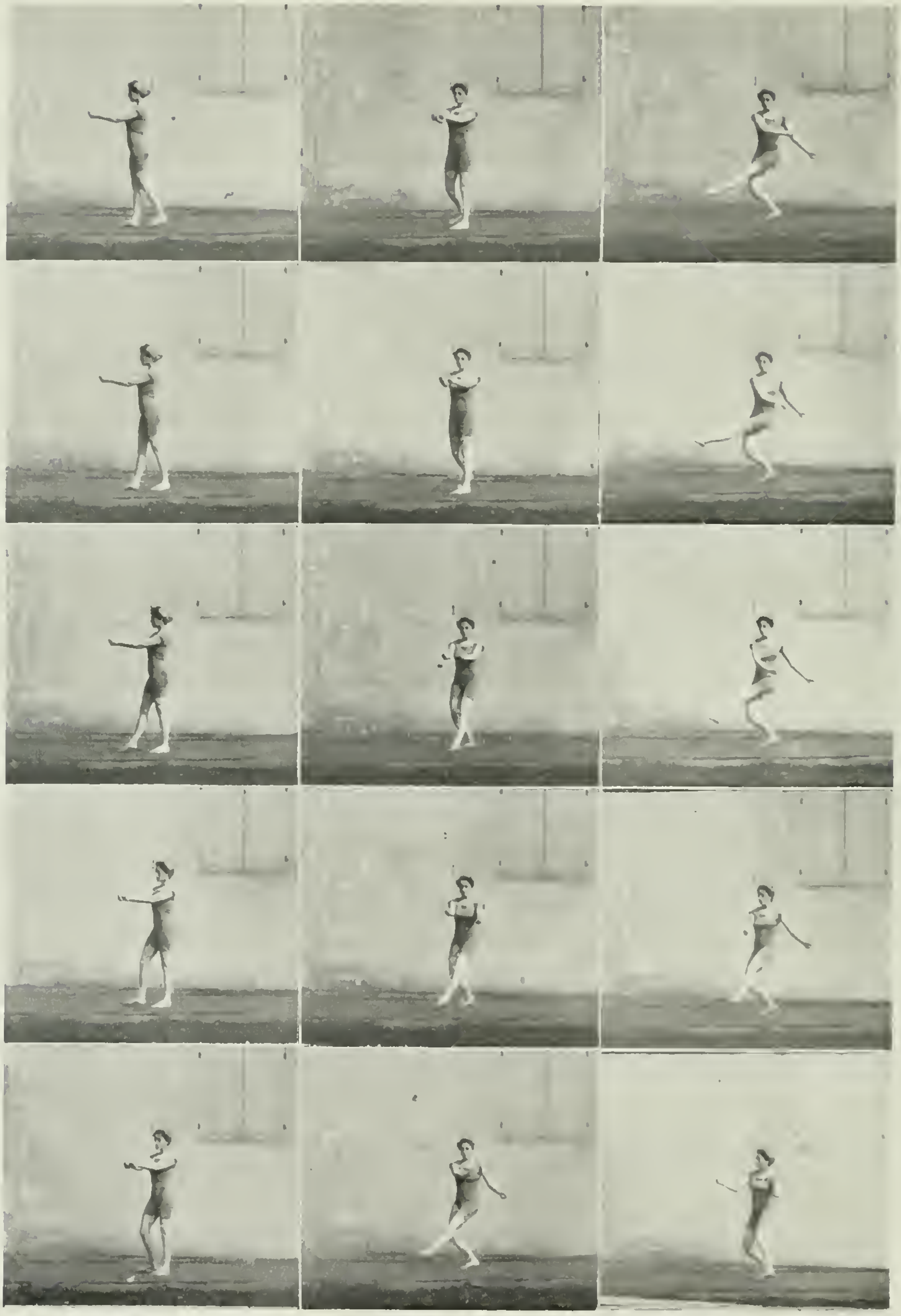
Continuation of Exercises VI. and VII.

purpose of showing how near the ground the knee may go without actually touching.

With this exercise ends the series selected as suitable for a complete training, although three times as many might have been shown, which give endless variety of movement. But it would be impossible to give them all in one book, and it will be for the really keen student to try and work out the various combinations rendered possible by the twelve "basic" exercises. For instance, try combining in one exercise Nos. 1 and 2: the result is beautiful though extremely difficult; but you see where the one glides into the other? On the horizontal lift of the left leg which occurs in the first exercise. Instead of bringing the leg to the ground again, make it swing downwards past the right, and back in a tense line to the left, turning the body to the right when the swing is half completed, and pulling round the right arm to the shoulder as in the backward swing of Exercise II. The position will then be that of the horizontal poise, the two combined movements having been executed on the ball of the right foot. Then take Exercises VI. and VII. and make the link always on the middle poise of the first of the pair. This combination makes a very fine series of photographs, and Cinema Series No. 14 is the only explanation I intend to give of this puzzle, which will prove interesting to work out. Another combination is shown as Cinema Series No. 15. This is formed of Exercises VIII. and IV., the order of numbering being the order of performance. Cinema Series No. 16 is a difficult puzzle-picture and shall remain so, as it is formed of a combination of two exercises not given in the series of twelve, both of which are more difficult than any yet explained. An enlargement of the twenty-first position is given as an example of extraordinary poise, in which the horizontal right leg with its pointed toes has entirely disappeared, from an effect of foreshortening. This poise is interesting from the fact that two violent changes of position take place on the toes of the left foot, which make two right-angle turns on a *bending and straightening knee.* This latter movement immensely increases the difficulty. Some of the final positions are not good, those especially showing the right leg in a horizontal line on the last turn are very poor when compared with the same movement in other exercises, but the sustained effort of poise in this sequence of movement is such as to make it an achievement if it succeeds in one out of every four. Then, again, the sight of what *not* to do will be a great help to beginners, and that dropping of the body when in the horizontal line, down on the left hip, is a useful object-lesson, as it is the immediate cause of the bending knee, and eventually of the loss of the whole balance. It will easily be seen what a tremendous effort was needed to prevent falling and to recover the final poise, which in itself is good.

An important fact to be remembered, after having acquired proficiency in these exercises, is that they do not demand as a *necessity* a daily repetition.

CINEMA SERIES, No. 15.



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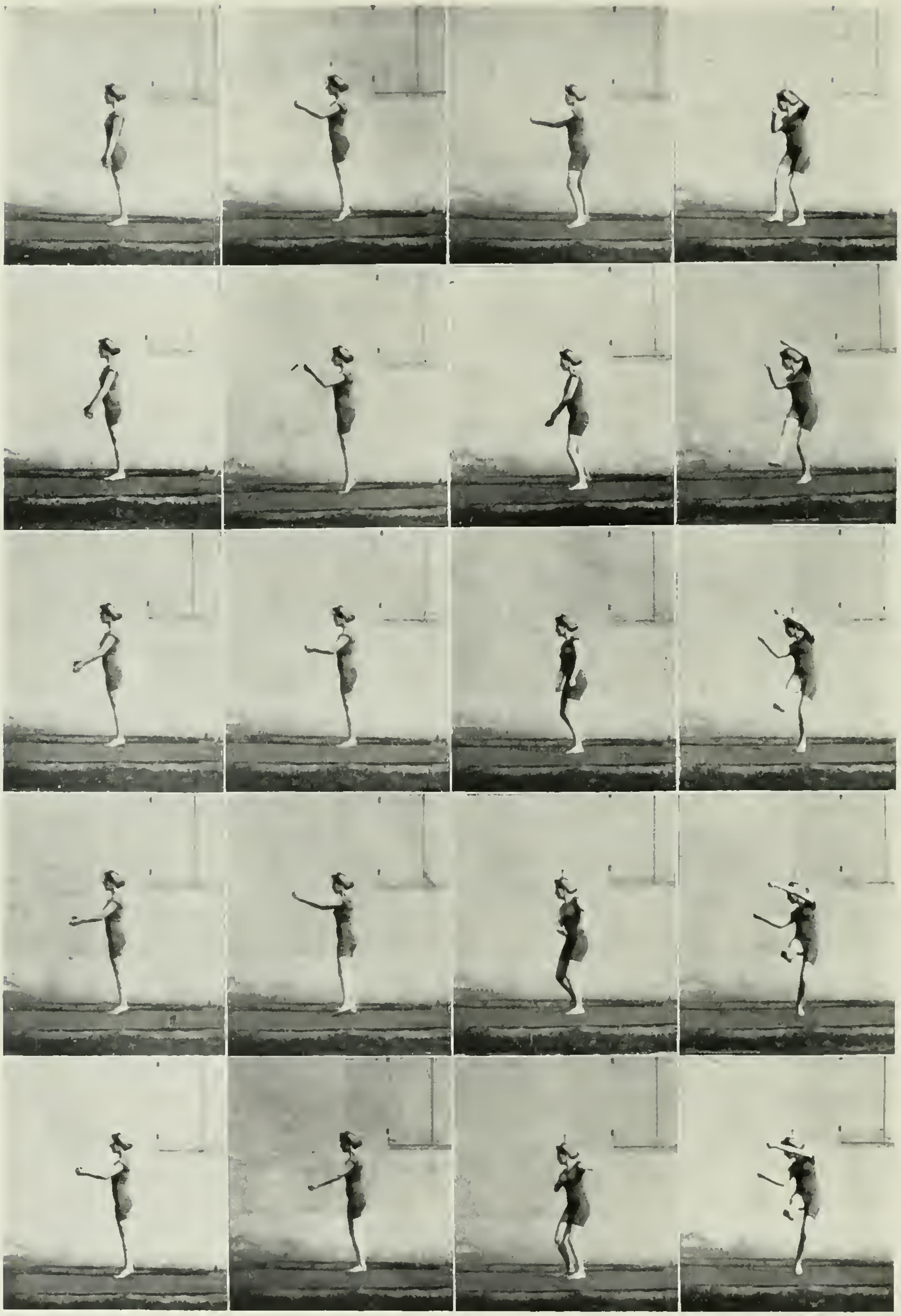
Combination of Exercises VIII. and IV.

# CINEMA SERIES, No. 15 (*continued*).



Continuation of Exercises VIII. and IX

# CINEMA SERIES, No. 16.



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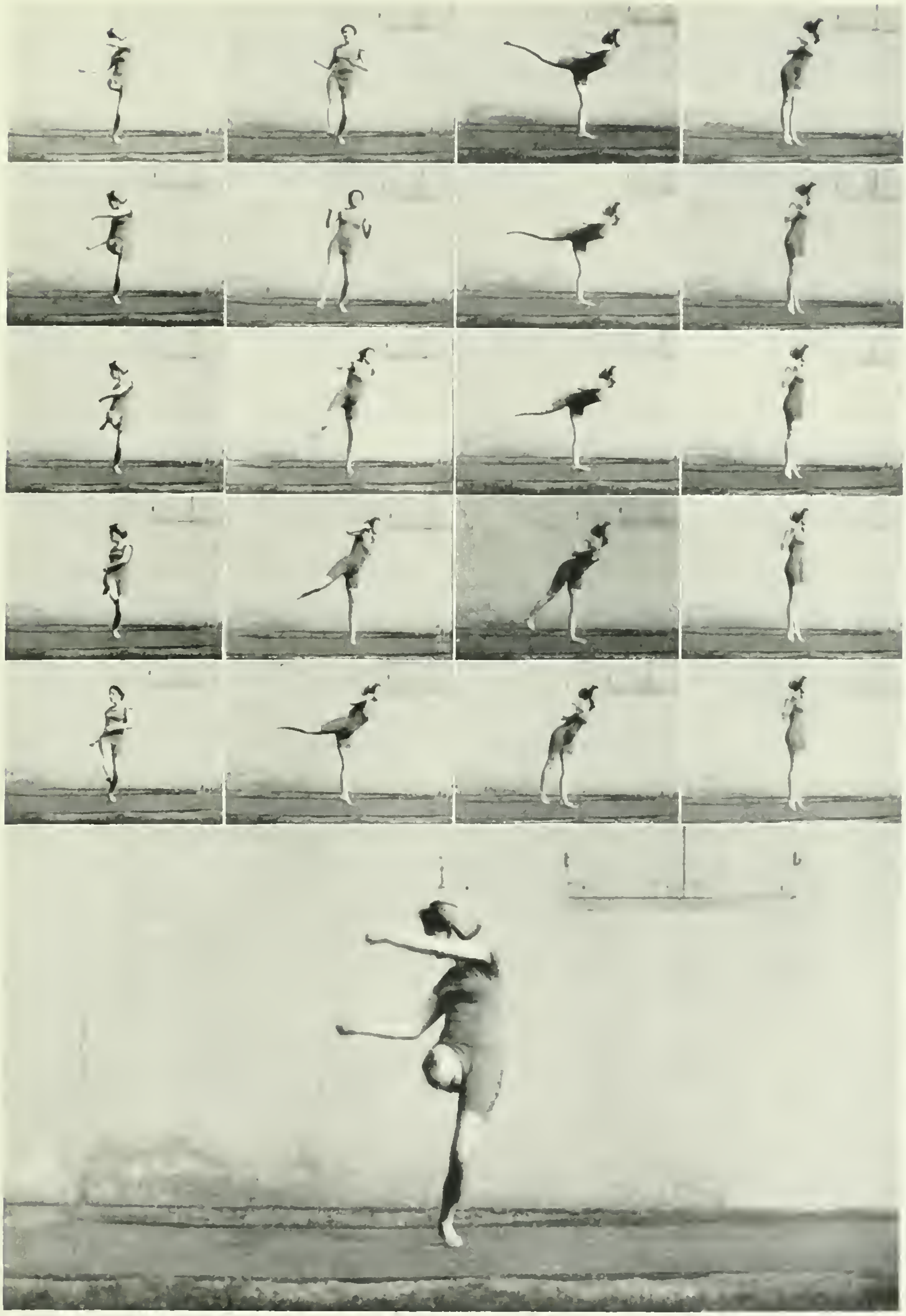
Puzzle Combination.

CINEMA SERIES, No. 16 (*continued*).



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Puzzle Combination (*continued*)

## EXERCISE XII

These twelve exercises have been selected specially for the purpose of making quite clear the fundamental principles of movement in general, and of balance under Tension in particular; so that when this knowledge has been acquired by practice, all the everyday movements of life afford complete exercise in themselves.

As far as possible, the basic exercises should be practised three or four times a week. Personally, I do some of them every day, if only for a few minutes, for the sake of the added lightness and exhilaration which they always bring. But I make no rule for others. For those who have had the energy and determination to work systematically through the whole series of twelve exercises, I may safely leave the regulation of further practice, knowing that the power and fascination of the exercises themselves will exert their own influence, when once they have formed part of the daily routine during a whole year.

This explanatory chapter will, I fear, have proved very dull reading, but it cannot be helped, for serious and difficult work of this kind claims from both writer and reader the utmost concentration, and the difficulties confronting both in elucidating and apprehending its full meaning are enormous.

The light touch possible in *viva voce* description becomes in print irrelevancy and distraction. Too much elaboration of details which in actual demonstration can be seen at a glance, produces complication. If, then, it appears very cut-and-dried, it must be remembered that the aim has been for lucidity and conciseness at the sacrifice of all else, and that the desire to render in words any idea of what the movements themselves are able to produce, of lift and exhilaration, has been rigorously repressed for the sake of those students who have the continuity of purpose to struggle through the physical difficulties to the end, and for whom the clear separation of the different phases of the work is the only chance of success.

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